(Omstinuction

Company, Inc. October 193



A CALMAN HAVE NITE LIVES . . . We've never seen proof of this tale about the cat . . . but we do know from experience that Inland Piling has been re-used as many as 15 times on a single job with important savings for the contractor.

We are told also that the suggestions and co-operation offered by Inland engineers have saved much time, trouble and expense on piling and other construction jobs.

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TEURINULUUT LALL

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CURRENT JOBS

and Who's Doing Them

Buildings

Public - Low bidder on U. S. Court Public — Low bidder on U. S. Court House in Kansas City, Mo., was Swenson Construction Co., of Kansas City, with a price of \$2,499,500. In Boston, Mass., Raymond Concrete Pile Co., of Boston, obtained foundation contract for 15-story hospital to cost \$2,000,000. For New York World's Fair of 1939, superstructure contract for New York City Building on Flushing Meadow, N. Y., went to Psaty & Fuhrman. Inc., of New York, for \$556,000. For the U. S. Treasury, Department, a silver deposit Treasury Department, a silver depository is being built at West Point, N. Y., by Boudin Contracting—Co., of New York, for \$528,900.

Commercial — Under separate contracts Noe Farms Estates, of Madison, N. J., is building in that community 100 residences costing over \$1,200,000 An employees' community project involving 550 houses and school, to cost volving 550 houses and school, to cost \$1,500,000 is under construction at Springhill, La., by McGregor & Pickett. of Shreveport, La. George Butler Con-struction Co... of Louisville, Ky., is building in that city 25 brick apartments to cost \$1,300,000. At Summit, N. J., Crest Acres Corp. is engaged on a 60-house development costing \$1,200,000. Contract for railway exhibition building for New York World's Fair at Flushing Meadow, N. Y., went to Geo. A. Fuller Co., of New York, for \$1,500,000. A \$1,-000,000 housing project at Cranford, N. J., has been started by **Thoreau Realty Co.**, of Elizabeth, N. J. For a 7-Realty Co., of Elizabeth, N. J. For a 7-story department store at Buffalo, N. Y., J. W. Cowper Co., of Buffalo, was successful bidder, with a price of about \$1,000,000. At a cost of over \$750,000, Union Construction Corp., of Chicago, is building in that city 398 residences. For a hotel at Roanoke, Va., J. A. Jones Construction Co., of Charlotte, N. C., was successful hidder with a tender Construction Co., of Charlotte, N. C., was successful bidder with a tender of \$952,000. A moving picture office building at Culver City, Calif., is under construction for \$750,000 by Geo. A. Fuller Co., of Los Angeles. R. S. Shoemaker, of Harrisburg, Pa., is contractor or a \$550,000 7-story apartment in that city. At Nashville, Tenn., N. Yearwood, local contractor, is putting up a \$500,000 bank and office addition.

Industrial — For a \$6,000,000 paper mill at Fernandina, Fla., Rust Engineering Co., of Pittsburgh, Pa., is contractor. At Cleveland, Ohio, American Bridge Co., of Pittsburgh, is building \$4,000,000 plant additions for American Steel & Wire Co. At Trenton, N. J., General Motors Corp., is constructing \$2,000,000 plant for which W. J. McShain, of Philadelphia, has contract; on foregoing project steel contract went to Bethlehem Steel Corp., and excavation and grading contract to Villa Contract Bethlehem Steel Corp., and excavation and grading contract to Villa Contracting Co., of Westfield, N. J. For Allis-Chalmers Co., at LaCrosse, Wis., Lovering-Longbottom Co., of St. Paul, Minn., is general contractor for \$1,000,000 tractor plant. American Safety Razor Co., has engaged Turner Construction Co., of New York, to build a \$550,000 factory in Brooklyn, N. Y. A \$350,000 plant for Owens-Illinois Glass Co., is being built at Newark. Ohio. by Hughes-Foulkrod Owens-Illinois Glass Co., is being built at Newark, Ohio, by Hughes-Foulkrod Co., of Pittsburgh. At a cost of \$500,000, Libbey Glass Co. is building a 4-story factory at Toledo, Ohio, with The Austin Co., of Cleveland, as contractor. In St. Louis, Mo., United Engineers & Constructors, Inc., of Philadelphia, are building a \$500,000 factory building for Keasbey & Mattison Co. International Harvester. Co., awarded, \$400,000, con-Keasbey & Mattison Co. International Harvester Co. awarded \$400,000 contract to J. L. Simmons Co., of Indianapolis, for industrial plant buildings in that city.

Highways

Among important highway contracts awarded last month were the following: New York City: section of West Side Elevated highway to James Stewart & Co., of New York, for \$1,203,000. Mississippi: 10.6 mi. of paving in Bolivar County to Carey-Reed Co., of Jackson, for \$241,679 Connections. for \$241,679. Connecticut: two sections concrete paving for Merritt Parkway
New Haven Road Construction Co.. of New Haven, for \$298,738, and \$263,078 respectively. Another Merritt Parkway contract in Connecticut went to Peter Mitchell. Inc., of Greenwich, for \$302,217. Other New York state highway contracts were awarded to Warren Bros. Road Co., of Utica, for \$223,684 and to A. W. Banko. Inc., of Hastings, for \$257,548. In Montana, 10 mi, of Blaine County work was tana, 10 mi. of Blaine County work was bid in by Peter Kiewits Sons. of Omaha, Neb., for \$212,458. In Pennsylvania, Quarry Stripping & Construction Co., of Hazleton, received a \$533,401 grade separation contract. New Jersey award-ed a \$344,000 contract in Union County ed a \$344,000 contract in Union County to LaFera-Greece Contracting Co., of Newark. In South Carolina, MacDougald Construction Co., of Atlanta, Ga., bid in a \$363,575 contract for 27 mi. of bituminous surfacing. In Michigan, a \$257,000 contract for concrete paving went to L. W. Edison, of Grand Rapids. In Iowa, Booth & Olson, Inc., of Sioux City, were successful bidders on a \$294,790 contract in Decatur County. In South Dakota, Western Asphalt Paving Corp. Dakota, Western Asphalt Paving Corp., of Sioux City, Ia., got a \$302,000 contract for concrete paving. In Minnesota, Nelson. Mullen & Webster, of Minneapolis, bid \$216,000 for 8 mi. of paving.

Waterworks

In Southern California a \$2,361,000 In Southern California a \$2,361,000 contract for section of Colorado River aqueduct was obtained by J. F. Shea Co., of Los Angeles. Bentley Construction Co., of Milwaukee, Wis., received a \$290,000 waterworks contract. Waterworks for new plant of Carnegie-Illinois Steel Corp., at Clairton, Pa., will be built by Rust Engineering Co., of Pittsburgh, for \$800,000.

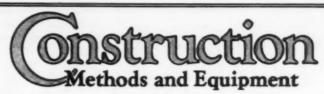
Sewers

Sewer contracts awarded last month Sewer contracts awarded last month included the following: Detroit, Mich., \$1,788,000 to Rosoff Bros., of Brooklyn, N. Y. Detroit, Mich., \$1,692,000 for sewage pumping station to S. A. Healy Co., of Detroit. Chicage, Ill., \$502,000 to James McHugh & Sons. of Chicago, for sludge incinerator. Long Island City, N. Y., \$570,000 to Di Salvo Contracting Co., of East Elmhurst. Denver, Colo., \$233,000 to E. H. Honnen Construction Co., of Colorado Springs, for sewage treatment works.

Bridges

Bridges
In Ohio, concrete bridge in Hocking County, was awarded to A. J. Battes, of Norwalk, Ohio, for \$312,000. Connell & Laub, of Roscoe, N. Y., bid \$610,000 for bridge in Tioga County. At Baton Rouge, La., substructure approach for new Mississippi River bridge went to Uvalde Construction Co., of Dallas, Tex., for \$598,000. On same project Steel Construction Co., of Birmingham, Ala., received \$1,634,000 contract.

At Port Huron, Mich., \$767,000 contract for International Bridge over St. Clair River, was awarded to American Bridge Co., of Pittsburgh; another superstructure



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WILLARD CHEVALIER, Vice-President

OCTOBER, 1937

The "How" of it

practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How CANAL SLOPE TRIMMING to accurate line was done by cutting blades on tactor-hauled machine. — p. 39

How GLASS BLOCKS were used to form exterior walls of New
— p. 42 York office building. — p. 42
How GROUT-BOUND STONE formed base for light bituminous pavement surface. — p. 44
How PERFORATED BOX at end of chute from mixer distributed grout on stone pavement base. — p. 45 v EFFECTIVE EOND between asphalt top and grouted stone base of pavement was provided by grooves formed by hand FLUIDITY OF GROUT for paving was controlled by flow How CONCRETE PIPE SECTIONS, weighing 41/2 tons, were laid by truck-hoe straddling cut. — p. 48
How PNEUMATIC-TIRED STEEL FRAME, drawn by tractor, transported heavy pipe sections to trench. — p. 48
How BLAST HOLES for pipe trench were sunk by wagon drills on tractor-drawn aled. How SAFETY NET, stretched under high bridge, protected painters of steelwork.

— p. 51

How AGGREGATE STORAGE and reclaiming for concrete dam construction was handled by stacker of new type. — p. 512
TIMBER CRIB BINS of octagonal shape were erected to hold aggregate. — p. 54
How STEEL ERECTION at tin plate mill was handled by crane with 105-ft. gooseneck boom. — p.
How SPREADING OF CRUSHED STONE for pavement base w simplified by wing extensions on bulldozer blade. — p. 58
How CRAWLER CRANES ON FLAT CARS, working as pair, handled steel for railway electrification. — p. 58
How PLYWOOD FORMS for sewage plant were braced by wales - p. 58 p. 58 and studes.

How TIMBER MATTRESS was fabricated for sinking to river bottom to stabilize foundation material at bridge pier site. — p. 58

How ASPHALT DRUMS were converted into waste receptacles for use along highways. — p. 59
How EARTH BORER was rigged on rear of motor truck to dig post

How HUGE LOG CRIB was built to hold highway fill along steep slope. — p. 59
How PUMPED CONCRETE was distributed by small machine for

warehouse construction. — p. 59

How INTERIOR PARTITIONS of buildings were securely anchored to concrete walls and ceilings by special device. — p. 60

How OPEN STEEL GRATING was employed to form lightweight

floor for big bridge. — p. 61 How FILLET WELDS, numbering 70,000, were made to anchor steel floor grating to bridge members. — p. 61
How CONCRETE MIXING PLANTS for big jobs are designed and

installed. — p. 62

How WELL POINTS drained foundation area for sewage pumoing station. — p. 67

How EXPANSION JOINTS in bridge wing walls were filled with sponge rubber.

ROBERT K. TOMLIN Editor

A. E. PAXTON Manager

Editorial Staff: Vincent B. Smith, John B. Huttl (San Francisco), Paul Wooton (Washington), Nelle Fitzgerald

contract on same project went to Wisconsin Bridge & Iron Co. of Milwaukee, for \$386,000. Grading contract for Bronx-Whitestone bridge, N. Y., was bid in by whitestone bridge, N. I., was bid in by Tully & DiNapoli and Slattery Contracting Co., of Long Island City, N. Y., for \$373,000. Franklin Contracting Co., of Westfield, N. J. secured \$321,000 contract for track separation and depression at Elizabeth, N. J.

Dredging

At Conneaut, Ohio, \$1,232,000 government dredging contract was awarded to Merritt, Chapman & Scott Corp., of New York City. At Lorain, Ohio, Great Lakes Dredge & Dock Co., of Cleveland, secured \$511,000 dredging contract while in that same locality \$495,000 contract went to Duluth-Superior Predging Co. went to Duluth-Superior Dredging Co.

They Want to Know

ANY YEARS AGO, when admission to the bar could be achieved with little formal schooling, a Kentucky judge listened impatiently to the awkward pleadings of a young attorney, obviously floundering beyond his depth.

"Counsellor," he eventually interrupted, "did you ever go to law school?"

"No, your Honor, I never did."

"Have you ever read any law?"

"Yes, your Honor, I have."

"Have you read Blackstone?"

"No, your Honor, can't say as I have."

"Have you read Kent?"

"No, sir, your Honor."

"Well, just what law bave you read?"

"I have read, your Honor, the statutes of the sovereign Commonwealth of Kentucky.

"Well, Counsellor," inquired the judge, "aren't you afeared that some day the legislature will meet down yonder at Frankfort and repeal all you know?"

The peril here cited by the learned judge lurks in the practice of every profession and every craft. The obsolescence of what we know is the dominating fact of American industry; and construction is peculiarly subject to it. What we knew yesterday as the last word in practice, today is on the way out. Today's practice will be out of date tomorrow. We have but to sit still to slide backward like lightning. Progress constantly is in session "repealing all we know."

PROGRESSIVE ENGINEERS and construction men know this and do their best to keep posted. That is the price they must pay for holding their places in a fast moving parade. Everyone familiar with the field knows this in a general way; recently this writer has had it brought home to him in striking fashion.

A couple of months ago this journal and its companion, Engineering News-Record, introduced a new feature in the form of a Reader Service sheet. From time to time this sheet reviews concisely the literature of data and information offered by manufacturers of materials and equipment

and makes it convenient for readers to request such material. One of these sheets appears in this issue.

If one had any doubt as to the live interest of construction men in new materials, equipment and their uses, he should wade through the returns from that service. Thus far only three of the sheets have appeared and already we have had to take on additional help to handle the correspondence properly. Nearly 9,000 pieces of manufacturers' literature already have been requested through this new service and the trend is steadily upward.

The inquiries cover every conceivable interest of the civil engineer and constructor. They touch upon excavating equipment, highway maintenance plant, waterworks and sewerage equipment, concreting plant, sheet steel, roofing, siding and other building specialties, liability insurance, paint, clay products, glass blocks, electrical equipment and so on "far into the night." These readers are not going to let today's noteworthy progress in materials and equipment repeal all they know

It is very evident too that they mean business; their appeals to the Reader Service Department are not perfunctory requests. At the outset, when we were so unexpectedly swamped by the rush of inquiries, we got a little behind with our replies. And did we hear from those who had written in! They wanted to know, they wanted to know right now and they wanted to know why we weren't telling them.

Several reasons, inherent in the industry, account for the very live and active interest of construction men in new methods, materials and equipment. It is unnecessary to review them here. This comment is merely to record the striking evidence produced by the new Reader Service as to the intensity of that interest at this particular time. Never before have engineers and construction men been so alert to keep up with the parade of new things and new practice; they are not going to sit tight while construction progress repeals all they know.

Gillard Thevalin

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EVERY DAY new machines are put to work on building projects of all types—machines which do better work in less time and at lower cost.

To the genius of America's machine designers goes all praise for these mechanical developments.

Yet without a like advancement in the science of lubrication, these modern machines would be of little benefit to industry. For no machine can perform without oil; and with each advance in machine design and speed

comes a greater need for effective lubrication.

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today is a group of Gulf scientists who work each day to find better methods and better oils to lubricate machinery. No lubricant is placed in service in the field until it has been thoroughly proved as best for its purpose.

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COLD NIGHTS PLAY SAFE—USE 'INCOR'

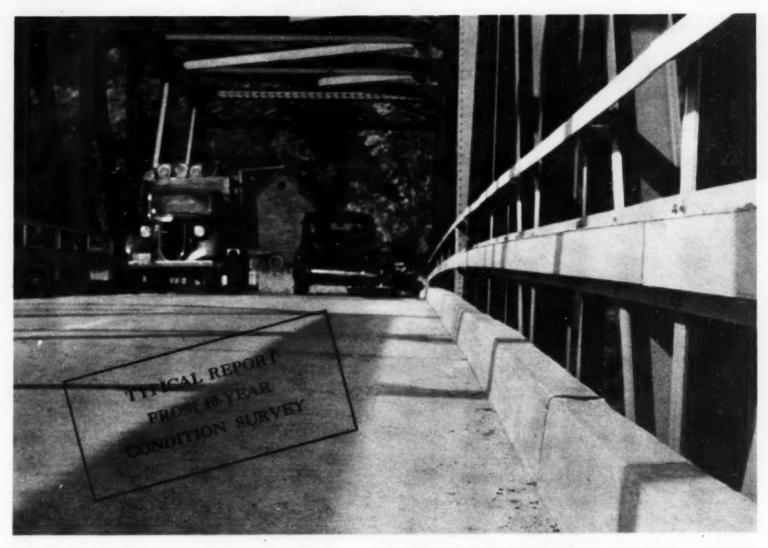
In the Fall, concrete is cool when placed—much colder than mid-day air temperatures—hardens but little the first night, and is exposed to risk of sudden temperature drop. To be safe, adequate protection is necessary, even when days are warm and sunny.

At this season of the year, 'Incor' 24-Hour Cement offers extra advantages to the engineer and contractor. With 'Incor', it is usually sufficient to heat mixing water and promptly protect the placed concrete against heat loss. 'Incor' is safe from freezing days sooner; heating and protection problems are

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*Reg. U.S. Pat. Off.



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LONE STAR CEMENT CORPORATION

MAKERS OF LONE STAR CEMENT ... 'INCOR' 24-HOUR CEMENT

CONSTRUCTION Methods and Equipment - October, 1937

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concrete

July 15, 1937

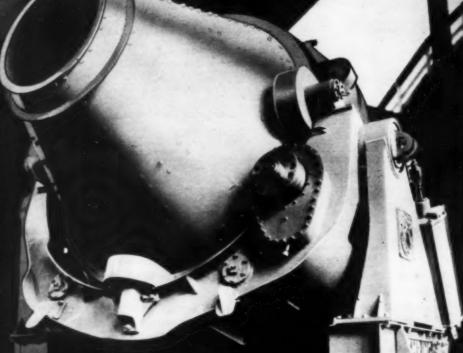
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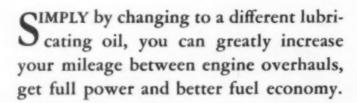
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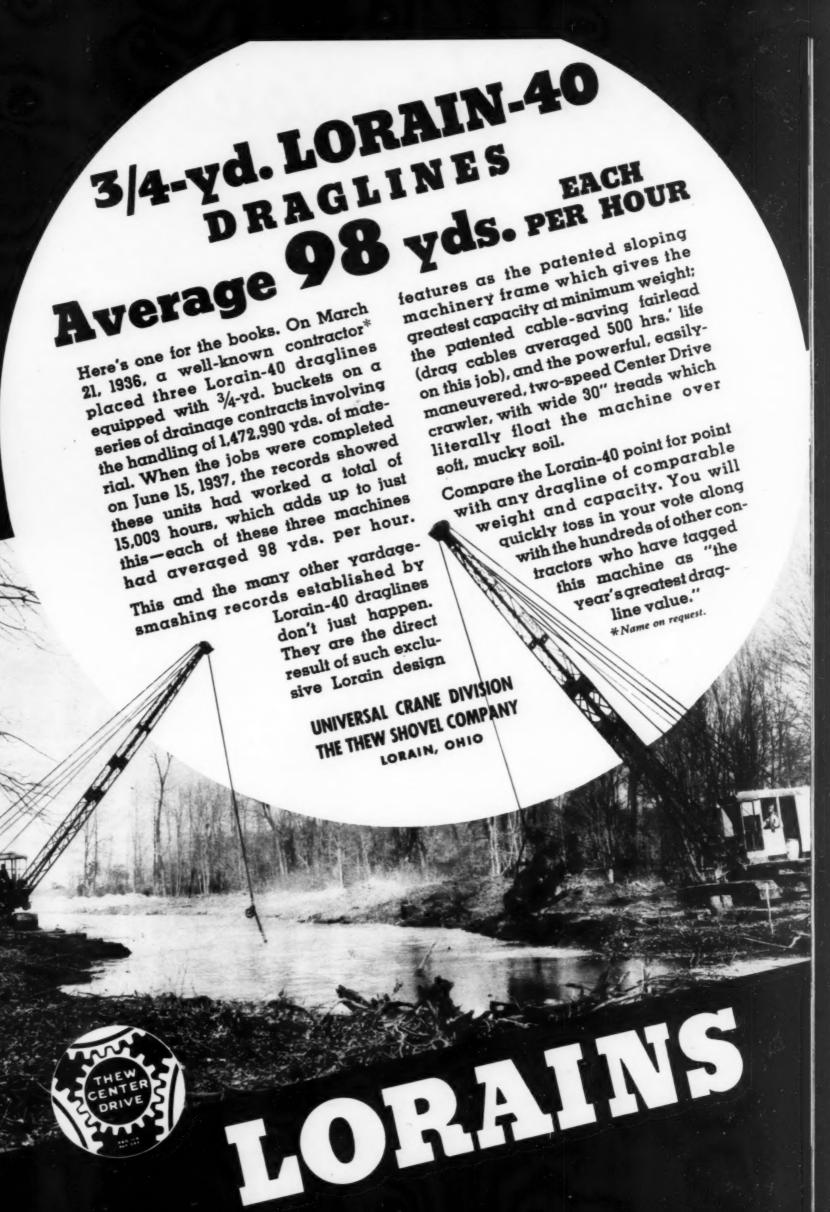
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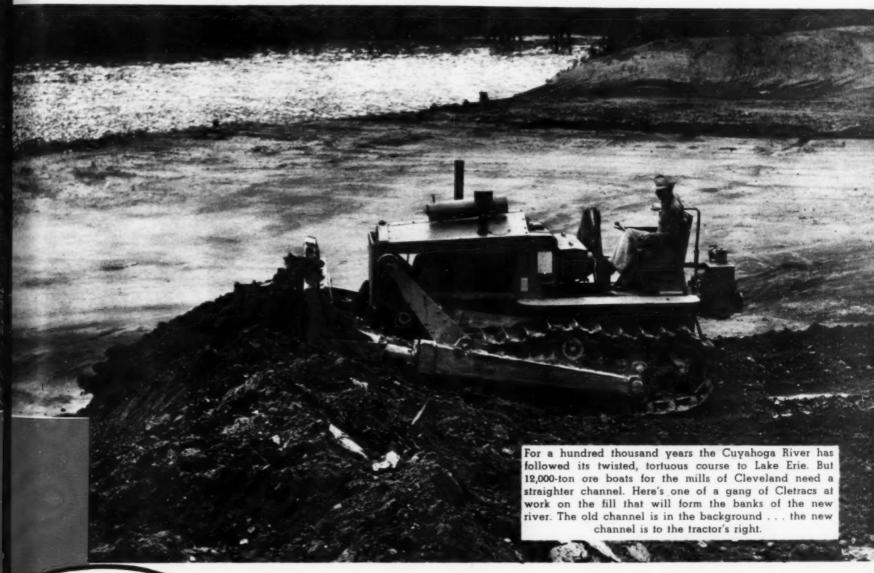
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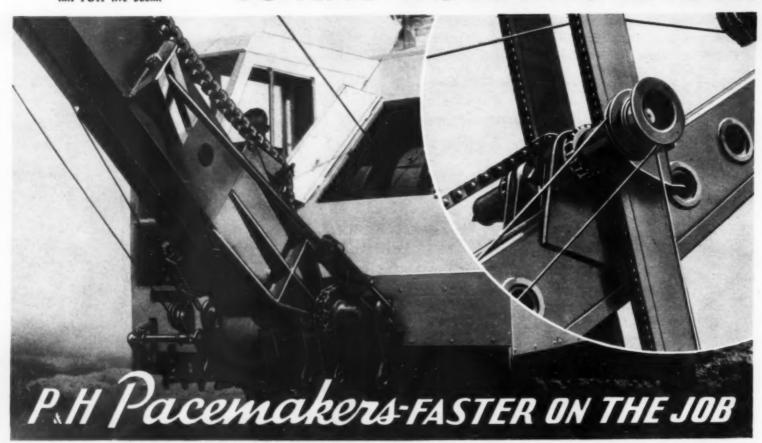
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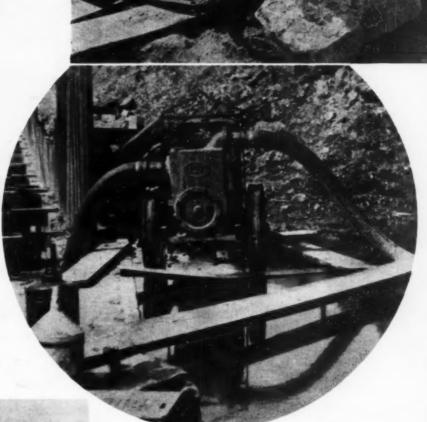
(Above) Refueling on the fly—There was no time to shut-down for refueling or for servicing the pumps in the late Ohio River flood. This Novo 6" Self-Priming Centrifugal Pump operated night and day all through the disaster.—This pump makes an unusual street scene in Covington, Ky., as it is pumping out the basement of a large department store.

NOVO REEL

OF JOB CLOSE-UPS

From the wide open spaces along the Rio Grande to the roaring metropolitan area of New York City come installation stories on Novo Pumps that are oustanding in news value to contractors.

(Below) Down on the Gulf of Mexico this Novo 4" Self-Primer is handling a pump killing job—Pumping salt water for large oil tank testing for the Republic Pipe Line Co. Only special part is the bronze impeller. Pumps 200 GPM through 500' of pipe line.



(Above) At Yonkers, N. Y., on a big sewer job, a Novo 4" Self-Primer kept the excavation dry throughout the operations. The water in the foreground is evidence that this was a wet job.

Get the Novo Self-Priming Pump Bulletin which gives complete information on various pumping jobs: capacity, head, friction loss in pipe, etc.

Novo will be glad to send without obligation com-

Novo will be glad to send without obligation complete information on their line of Centrifugal, Diaphragm, Pressure, and Road Pumps, also, Hoist and Light Plants.

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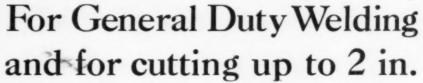
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PISTON RINGS
American Hammered Piston Rings





Have your Purox jobber demonstrate how this outfit combines economy with all-around utility. A complete welding range is covered by the Purox No. 35 Welding Torch, while the ordinary cutting requirements are met with the Purox No. 31 Cutting Attachment. Complete outfit . . \$99.00

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

UEE

New York and Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

*Trade-Mark

937

Visit the Linde Exhibit — Booth H52 National Metal Show, Atlantic City, N. J., October 18-22, 1937

YRUS-ERIE



Page 18

October, 1937 - CONSTRUCTION Methods and Equipment



FOR QUICK LOW-COST DIRT USE

LeTOURNEAU ANGLEDOZERS AND BULLDOZERS

Nearly every construction job has scores of uses for a Bulldozer or Angledozer. LeTourneau owners use them for moving big yardages on short hauls, bucking out rock, facing dams, clearing everything from light brush to big trees, pioneering cuts, handling aggregate, crowding ore to mine hoppers, etc. LeTourneau Bulldozers and Angledozers handle those jobs easily and quickly, because they are designed to dig, because they have the strength to stand up under punishing work, because fast cable control speeds their work and keeps tractors from stalling, because a high, powerful lift and extremely low drop enable them to do things impossible to the conventional trailbuilder or bulldozer. Ask your "Caterpillar" tractor dealer to show you what a LeTourneau Bulldozer or Angledozer can do on your job.



LeTourneau Angledozer and "Caterpillar" RDS tractor pushing big boulders out of a cut near Sait Lake City, Utah. The rock was unparted by a LeTourneau Rooter, pulled by this same tractor. LeTourneau Angledozer and Rooters form profitable combination for work in rocky or tough materials.

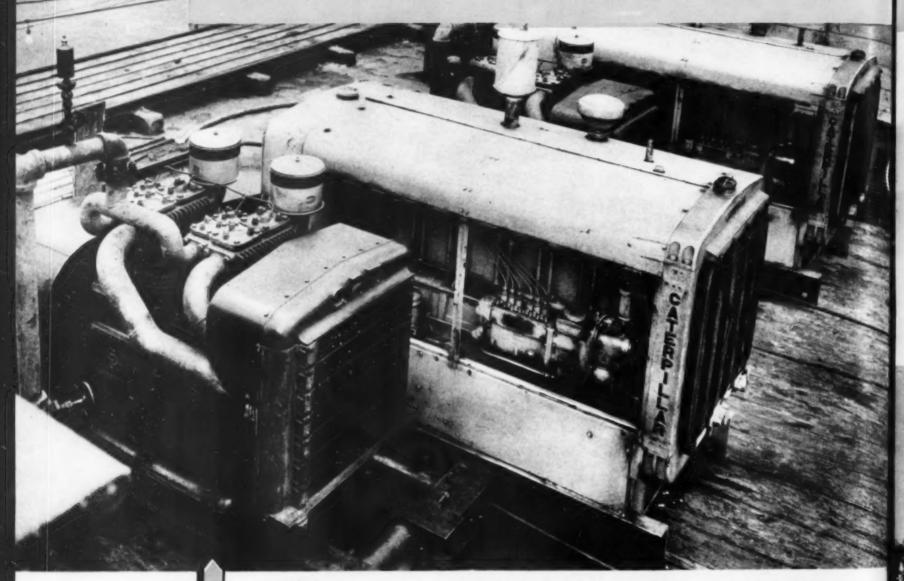


ETOURNEAU

R. G. Le TOURNEAU, INC. - Peoria, Illinois - Stockton, California - Cable Address: "BOBLETORNO"

Manufacturers of . . . ANGLEDOZERS', BULLDOZERS, CRANES, CARRYALL' SCRAPERS, BUGGIES', DRAG SCRAPERS, ROOTERS',
POWER CONTROL UNITS, TREEDOZERS

Name Vour



"A. D. COOK" pump, powered by a 47-hp. "Caterpillar" Diesel Engine, operating an overhead irrigation system on a large truck farm near Williamstown, N. J. (Pumps 30,000 gals. of water per hour at a fuel, lubrication and maintenance cost of only 14½c.)

CATERPILLAR DIESEL ENGINES

CATERPILLAR TRACTOR CO., PEORIA, ILL. . . . WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES

Power Problem ... say Caterpillar Diesels

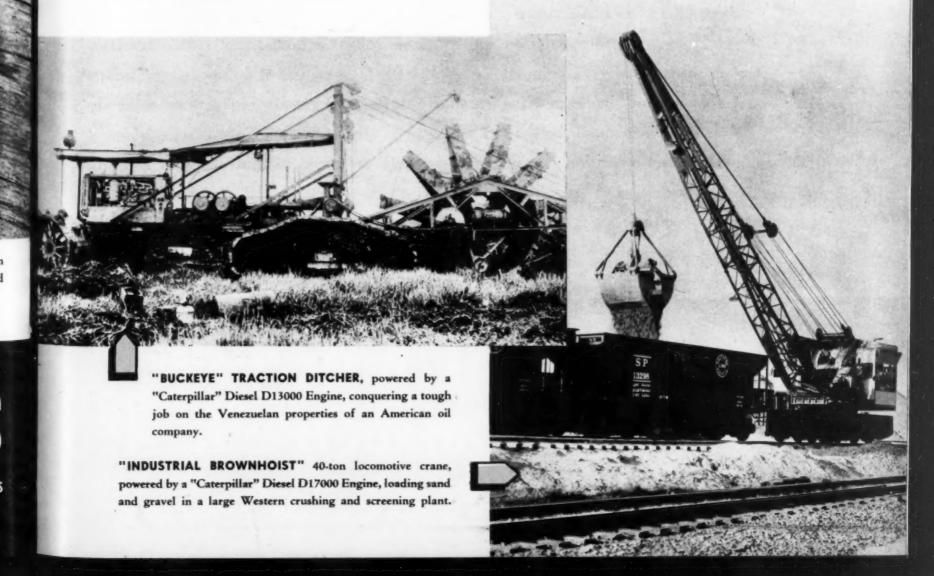
THIS CHALLENGE is backed by the fact that "Caterpillar" Diesel Engines are now being used on practically every type of power job throughout the world.

Manufacturers of all types of equipment have found that these power units will make their products perform more economically and efficiently. And no matter where the job is located, the dependability

SEVEN ENGINE SIZES — 44 TO 160 HP. More than 80 leading machinery and equipment manufacturers power their products with "Caterpillar" Diesel Engines. Sales and Service facilities throughout the world.

of engine performance is backed up by a complete organization of service men and facilities.

Savings of one-half to three-fourths of former power costs can be shown in so many instances that they are no longer news to those who have followed "Caterpillar" Diesel progress. Facts, figures and recommendations pertaining to any kind of power need are available on request.



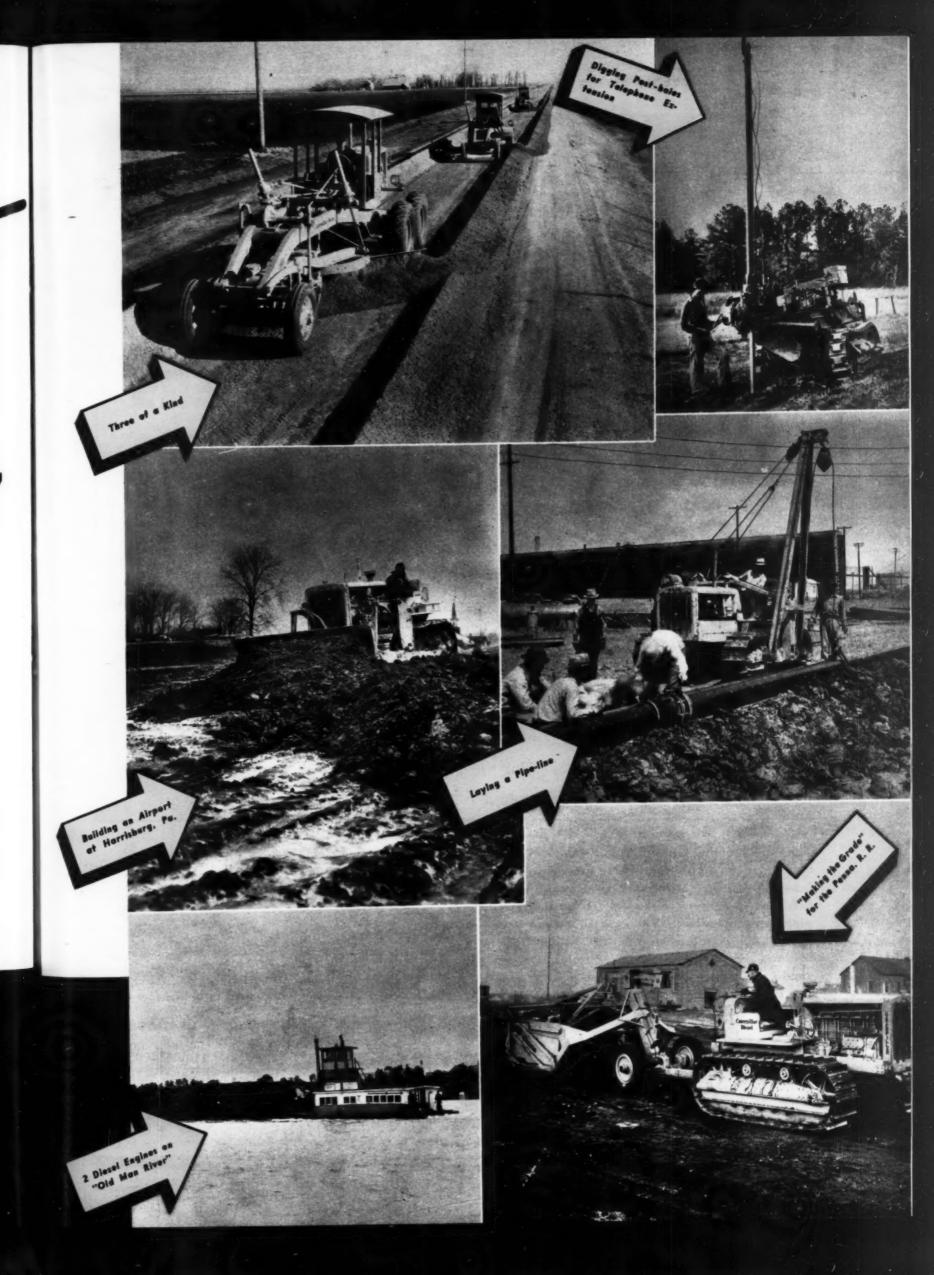
By "CATERPILLAR" DIESELS

This is no mere figure-of-speech. "Caterpillar" Diesel equipment serves all means of transportation and communication. It builds the roads and road-beds on which automobiles and railway trains travel. It builds and maintains ports for airplanes flying the skyways. It powers boats on rivers. It helps lay pipe-lines under the ground. It aids in telephone-line construction. Economical Diesel operation permits the profitable extension of these lines of communication and transportation. With maintenance to follow with the same speed, efficiency, and economy. You need "Caterpillar" Diesels by all means.

CATERPILLAR TRACTOR CO. PEORIA, ILL.



WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES,
TRACK-TYPE TRACTORS AND ROAD MACHINERY





These outstanding tamping rollers guarantee morethan surface compaction. There are no voids left below the surface after packing to cause highway fills, dams or levees to settle after the job is completed. Each individual sheep's foot contacts the ground tightly and leaves the print without tearing up large chunks of earth or creating unnecessary suction. Hollow drum construction permits adjusting ballast weight to meet any conditions and reduces shipping weight. Easy to fill or drain. Available in single, double or triple drum units. Tamping rollers oscillate and conform to the working surface. Extra-heavy teeth-cleaning attachment locks the drum when it becomes wedged, thus preventing breakage. Contractors like LaPlant-Choate Sheep-Foot Tamping Rollers because they are thorough, dependable and economical to operate!

For complete details contact your nearest "Caterpillar" dealer or write direct to the manufacturer.

BULLDOZERS ROAD SCRAPERS **SNOW PLOWS**

NT-CHOATE BRUSH CUTTERS RUBBER WHEELED WAGONS

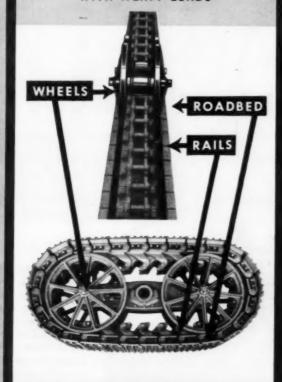
CEDAR RAPIDS, IOWA.

NOTHING ROLLS SO EASILY AS

STEEL WHEELS ON STEEL RAILS



THE "STEEL HIGHWAY" MEANS All-Weather Operation WITH HEAVY LOADS



THAT'S WHY YOU NEED THIS "STEEL HIGHWAY" FOR YOUR HEAVY LOADS

You've seen steel railroad wheels moving easily over their steel tracks. Athey puts this "steel highway" principle to work for you in Athey Forged-Trak Wheels. Steel wheels run on steel rails over a self-laying steel roadbed. You are independent of weather and ground conditions - of mud, sand, snow and steep grades.

Athey 2-Way Dump Trailersmounted on Athey Forged-Trak

Wheels-give you the steel highway in its most practical form for your work. These units dump swift and clean, either to right or left. They have heavy, rigid frames to stand the constant shock of loading and roading. They are easier to maneuver in tight places. Use Athey Forged Trak 2-Way Dump Trailers with "Caterpillar" Diesel Tractors to lower YOUR hauling costs. See your "Caterpillar" dealer or write us.

ATHEY TRUSS WHEEL CO.

Chicago, III.

Cable Address: "Trusswheel" Chicago

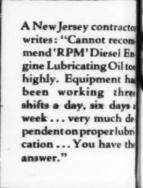
ATHEY Forged-Trak

2-WAY DUMP QUARRY TRAILERS

PATENTED- and proved in world-wide service

A Minnesota highway contractor writes: "Operated 5 'Caterpillar power units for approximately 10,000 hours... lubricated with 'RPM.' Did not lose a minut of time nor spend on penny on upkeep of motors. Finest oil on the market."

An Illinois road construction company writes: "A year ago we purchased a 'Caterpillar' Diesel engine ... since that time we have used 'RPM' Diesel Engine Lubricating Oil. On checking motor, find engine in perfect shape."



Tested and PROTEING OIL

"RPM" Diesel Engine Lubricating Oil is Distributed in the United States by:

CALIFORNIA COMPANY, THE (Montana only)
CARTER OIL COMPANY, THE, Tulsa, Oklahoma
COLONIAL BEACON OIL COMPANY, INC.
HUMBLE OIL & REFINING COMPANY
STANDARD OIL COMPANY (Indiana)
STANDARD OIL COMPANY (Incorporated in Kentucky)
STANDARD OIL COMPANY (Nebraska)
STANDARD OIL COMPANY (Ohio), THE
STANDARD OIL COMPANY OF CALIFORNIA
STANDARD OIL COMPANY OF LOUISIANA
STANDARD OIL COMPANY OF NEW JERSEY
STANDARD OIL COMPANY OF PENNSYLVANIA
STANDARD OIL COMPANY OF TEXAS
UTAH OIL REFINING COMPANY

In Canada by:

IMPERIAL OIL LIMITED
STANDARD OIL COMPANY OF BRITISH COLUMBIA LIMITED
and by distributors in more than 100 other countries.



A California tractor operator writes: "I am doing all the farm work of about 8,000 acres and is vital that my equipment operate without breakdowns or delays. I depend on your 'RPM Diesel Engine Lubricating Oil to keep my engines running at top efficiency, and recommend it to every operator of 'Caterpillar' Diesel equipment."

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DIESEL ENGINE LUBRICATING OIL

CAUTION—There is only one Diesel engine lubricating oil identified by the "RPM" trade-mark.



A California contracting company writes: "My eight 'Caterpillar' Diesel tractors have accumulated in excess of 30,000 work hours in most grueling operations with 'RPM' Diesel Engine Lubricating Oil. During this time we have had no ring sticking trouble ... engines run clean.

A North Dakota equip-

ment company writes: "At least 90% of the

'Caterpillar' Diesel engine owners in our terri-

gane owners in our terri-tory are using 'RPM' ex-clusively. Oil has been subjected to tempera-tures as high as 120" in summer, down to 40" be-

low in winter.

SETS NEW RECORDS FOR PERFORMANCE

IF IT'S A BIG-TIME JOB FOR YOUR "CATERPILLAR" DIESEL -YOU'LL NEVER MISS A TRICK WITH THIS WORLD-FAMOUS DIESEL ENGINE LUBRICATING OIL!

"Caterpillar" Diesel operators throughlays. I out the world are talling RPM sensational oil discovery out the world are talking about this

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bricat "RPM" Diesel Engine Lubricating Oil t top patented and identified by the tradeecom mark "RPM."

Acclaimed in world-wide service—it's r' Die a super-active oil that's been thoroughly tested and proved -

> It's broken all records for Diesel Engine top-performance-for "red-hot," full - load day - and - night operation. Grueling runs at full blast for thou

sands of hours proved that rings and pistons stay clean - that maintenance costs drop to lowest in history.

"Caterpillar" Diesel engine operators everywhere report amazing results -"the more punishment, the better it works!"

You'll be equally enthusiastic. Get the full benefit of your "Caterpillar" Diesel equipment.

Insist on this famous, patented "RPM" Diesel Engine Lubricating

Recommended by Caterpillar Tractor Co.

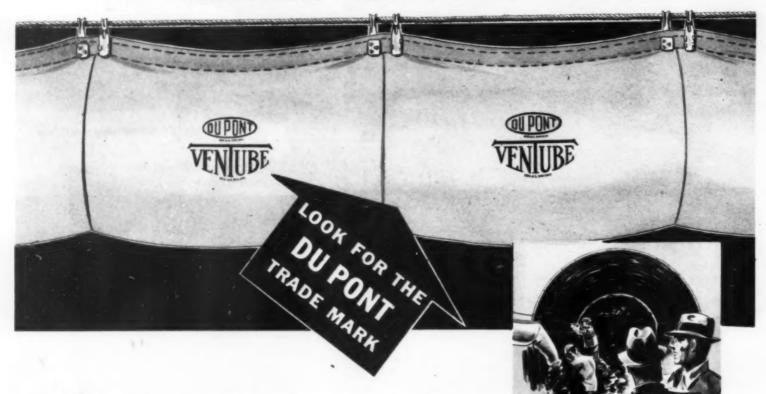


An Idaho general contracting company writes: "We find that 'RPM' Diesel Engine Lubricating Oil stands up better than any other oil we have used in our six 'Caterpillar' tractors."

STANDARD OIL COMPANY OF CALIFORNIA

10 YARDS or 10 MILES-

You won't find a Weak Section in "VENTUBE" VENTILATING DUCT



THERE'S ONLY ONE genuine
"Ventube" ventilating duct.
Every yard carries the du Pont
insignia of extra wear and extra
quality. Look for the "Ventube"
trade mark—and know you're getting the best.

"Ventube" is made of extraheavy, long fibred Hessian cloth. It is coated and impregnated with resistant rubber. Even concussion has little effect on "Ventube." The tear resistance of the warp is as strong as the filler. Acid water, damp or dry rot, fungus, moisture or gases will not harm "Ventube."

"Ventube" weaves in and out of irregular passages. It saves money on costly break-throughs. An abundant supply of fresh air is carried to the most remote faces.

The new type suspension hook hangs "Ventube" in a jiffy. Sections secure in air-tight joints in a few seconds. When blasting, "Ventube" slides back from the working face.

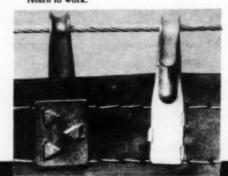
Du Pont "Ventube" has helped speed up work on record tunneling jobs. It can save time and money for you, too. Test "Ventube" on your next job—where you can actually see how it saves man-hours

and cuts ventilating maintenance costs. Distributors are within quick and easy reach.

The biggest item in tunnel driving is labor. "Ventube" goes up fast. Saves a lot of manhours—and that means real money.



When blasting, "Ventube" can be withdrawn from the working face. Afterward, it slides back to exhaust gases and to permit quicker



These new type suspension hooks save time in hanging and moving "Ventube" ventilating duct. They're unusually secure and easy to handle.

E. I. DU PONT DE NEMOURS & CO., INC.

"Fabrikoid" Division

Fairfield, Connecticut

The proper use of modern steels and alloys at critical points is your assurance of long uninterrupted service with a Blaw-Knox DREADNAUGHT Bucket.

There are no "weak links" in Blaw-Knox construction. Outstanding features which prove vital to long life and successful bucket performance, are-

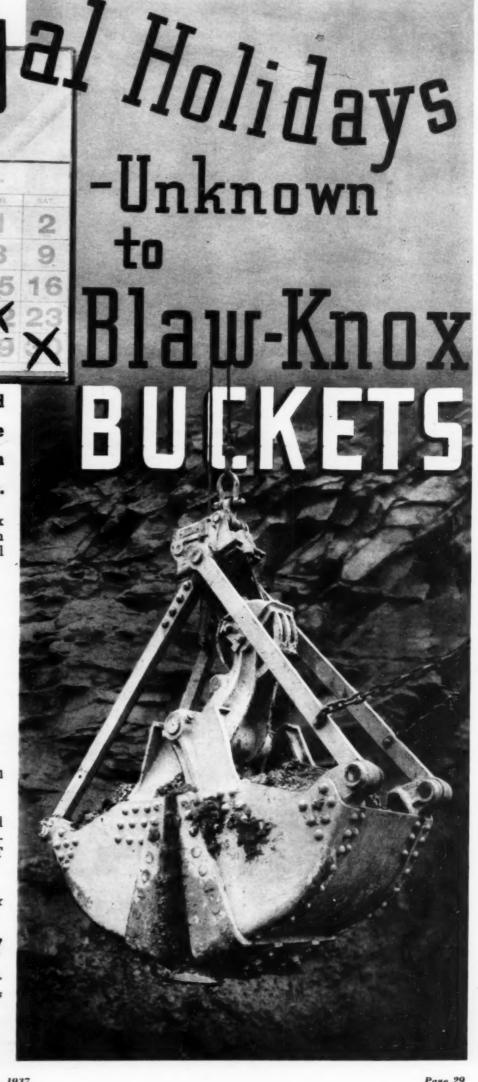
- * the One Piece Cast Head
- * Heavy, Forged, One Piece Corner Bars
- * Hardened Alloy Steel Cutting Lips
- Hardened Steel Pins and Guide Rollers
- * Ball Bearing Equipped Lever Arm Sheaves
- Reeving Without S-Bends Eases the Wear on Wire Rope

If you aim to reduce maintenance costs and prolong the useful life of your buckets-investigate the Blaw-Knox DREADNAUGHT for all types of digging and rehandling.

Send for Bulletin No. 1561-"Blaw-Knox Buckets for Contractors".

BLAW-KNOX COMPANY

2086 Farmer's Bank Building · Pittsburgh, Pa. Offices and Representatives in Principal Cities



The B-a Line PERMANENT CARRIERS ADERS RAVEL PLANTS CENTRAL PLANTS INISHERS



It will pay you to investigate the Barber-Greene Bucket Loader.

Just ask for Bulletin 82, there is no obligation.

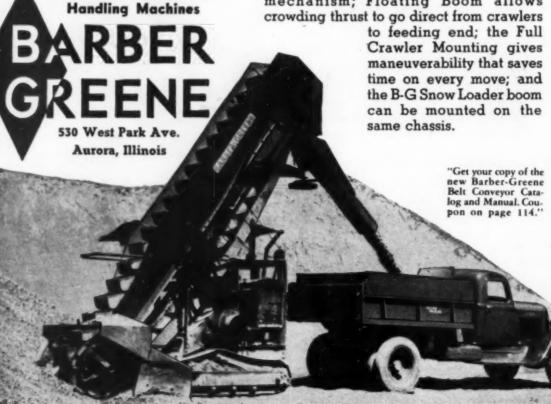
Also ask for our new 52 page booklet "Good Roads" which shows the complete line of Barber-Greenes for contracting.

Standardized Material

HE primary advantage of the Bucket Loader is simple—it is the cheapest means of loading bulk material. It will probably pay for itself even though you have other equipment now being used for loading. It is generally regarded as one of the most valuable tools for contracting. In addition to low cost, high capacity loading, it is advantageously used for screening, stripping, light excavating, accurate grading, backfilling, etc.

backfilling, etc.

The B-G 82 Bucket Loader is an outstanding achievement in equipment design. Synchronized Feeding gives higher capacity with less power consumption; the Automatic Overload Release protects the machine, eliminates delays; Slow Crowding Speed gives easier, more efficient operation; Fast Traveling Speed saves money and time; Tank Type Chassis Frame gives greater strength; and encloses all driving mechanism; Floating Boom allows crowding thrust to go direct from crawlers



HOW TO MAKE PROFITS

from a "Sit-down"

• The operator of a Link-Belt Speed-o-Matic shovel "sits down" at his work. Hydraulic pressure control replaces physical brawn in the work of operation. Short, easy-throw handles and pedals take no more physical effort to move than is required in driving an automobile.

Consequently the operator does not tire out easily and slow up his pace. He is able to *maintain*, all through the work shift, the greater speed of which Speed-o-Matic is capable. The result is more yardage moved at lower cost.

Speed-o-Matic is extremely simple... simple to operate and simple in design. It has fewer parts... rereduces wear on clutches, brakes, etc.... requires no complicated or sensitive adjustments. It gives the operator perfect control of the machine... the "feel" of the clutches and brakes at all times.

Link-Belt Company, 300 W. Pershing Road, Chicago. Distributors and Offices in Principal Cities.

Visitors are always welcome at our Chicago Plant testing grounds to witness demonstrations of Speedo-Matic machines.

Development of Link-Belt Speedo-Matic control puts manual lever-operated shovels back in the class with automobiles you had to crank by

had to crank by hand.......Today you push a starter button in your car, drive farther and feel fresher at the



el fresher at the end of the day. With the Speedo-Matic control and its twist-ofthe-wrist levers, you make more dirt "go places" all day without fatigue.



LINK-BELT Speed-o-Matic SHOVEL DRAGLINE - CRANE

P. N. NOOLSORTHI CO. P. N. NOOLSORTHI CO. P. N. NOOLSORTHI CO.

General contractors: John Lowry, Inc., New York Floor contractors: Brennan & Sloan, Inc., New York

Fifth Avenue corner 39th Street is costly property. Quick occupancy was of obvious advantage to owners. Quick floor construction was essential. Lehigh Early Strength Cement was used. In minimum time after placing concrete for 24' floor spans, forms were removed and traffic permitted. Sub-contractors were enabled to move in equipment and proceed with their work.

PACING THE JOB
With
Quick
FLOOR
CONSTRUCTION

Speed in construction, continuous operation and coordination of schedule frequently depend upon the quick completion of key portions of the work. Quick service concrete is frequently the expediting means. In building construction where continuous operation awaits the curing of concrete in floors, toundations, abutments, beams, arches or other key portions, delays are minimized. For any construction the same relative advantages result.

Under any conditions and temperature, Lehigh Early Strength Cement will produce concrete of equal strength in one-third to one-fifth the time required when normal portland cement is used. It saves on labor, overhead, form costs and heat protection costs in cold weather.

The Lehigh Service Department will gladly answer any questions.



LEHIGH PORTLAND CEMENT COMPANY Allentown, Pa., Chicago, Ill., Spokane, Wash.

LEHIGH EARLY STRENGTH CEMENT



machined on FOUR sides. Anti-chatter circle mounting—with double to triple the usual circle support. Extra moldboard rigidity means better work.



ALLIS-CHALMERS SPEED PATROLS

SINGLE OR TANDEM DRIVE.. NO. 42 AND NO. 54 SIZES .. GASOLINE, DISTILLATE, DIESEL FUEL OIL

Features found in no other line of shovels, cranes and draglines!

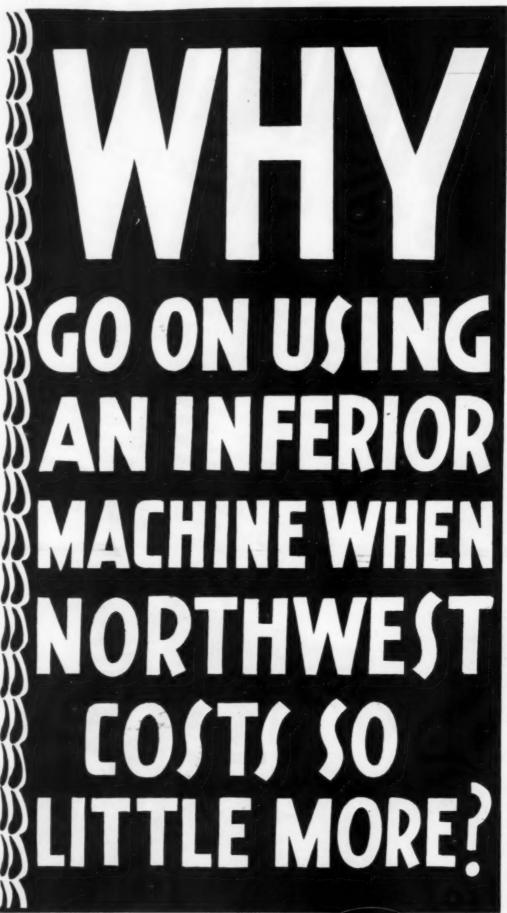
- · Simplicity of design that means easy maintenance.
- The "feather-touch" Clutch Control for easy operation.
- The Cushion Clutch increases machine life by reducing strains on every part under power when shock loads are encountered.
- Uniform pressure smooth acting ventilated swing clutches.
- Ball and roller bearings on all high speed shafts.
- The Northwest Independent Shovel Crowd that utilizes power other shovels waste.
- The Helical Gear Drive.
- Self-cleaning crawlers.
- Welded shovel boom and dipper sticks.

NORTHWEST ENGINEERING COMPANY

The world's largest exclusive builders of gasoline, oil, diesel or electric powered shovels, cranes, draglines, pullshovels and skimmers 1728 Steger Building

28 E. Jackson Boulevard Chicago, Illinois



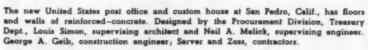


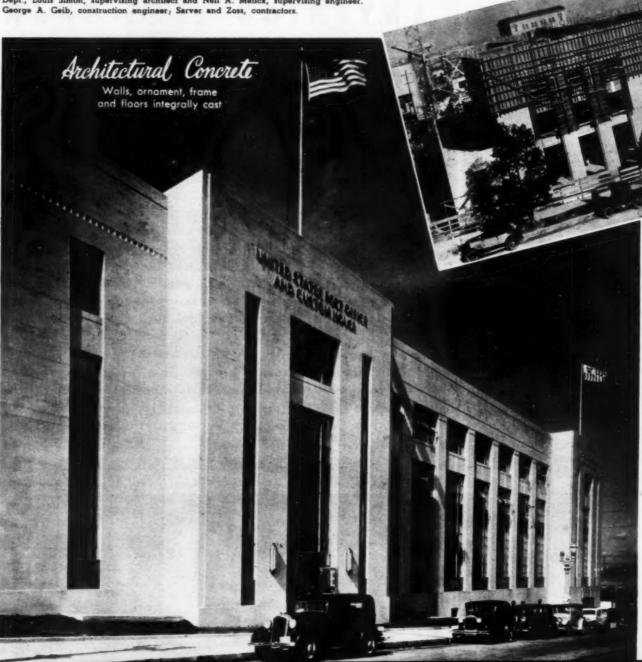
DIESEL . . ELECTRIC OIL

SHOVELS CRANES

· PULLSHOVELS

in a range of 18 SIZES





TOMORROW...you may land a job like this

Uncle Sam's new Post Office at San Pedro is an arresting example of the beauty achieved at low cost with Architectural Concrete.

Buildings of all kinds—big and little, commercial, public and private—are being designed to take advantage of Architectural Concrete's beauty, firesafety, moderate cost and low maintenance. There is a special construction technique by which contractors can deliver high quality jobs at low cost. Write for the free manual, "Forms for Architectural Concrete," and the handy "Concrete Guide, with Tables of Quantities of Materials."

PORTLAND CEMENT ASSOCIATION

DEPT. 10-16, 33 W. GRAND AVE., CHICAGO, ILL.

A National Organization to Improve and Extend

A National Organization to Improve and Extend the Uses of Concrete

TOO IMPORTANT FOR ANYTHING LESS THAN

DEPENDABLE POWER

 A half-million dollars worth of equipment is in use on the Keystone Dam project.

It is significant that a multiple unit Cummins Diesel generating plant was chosen to supply current for 275 to 300 electro motor horsepower on this important job. The contractor took no chances-he bought Cummins Dependable Diesels-three 200 hp. Model LI-600's.

In addition, two 12-inch pumps powered by Cummins Diesels operate continuously; a Model HP-601 power unit drives an air compressor of 360 cubic feet capacity; a second Model HP-601 will soon be driving another air compressor . . . a total of five Cummins Diesels on this one project.

On important jobs where dependable power is a first essential, whether it be for generating, pumping, powering shovels, or operating compressors, contractors choose the Cummins Diesel. Should you be satisfied with anything less? Cummins Engine Co., 1700 Wilson St., Columbus, Indiana.



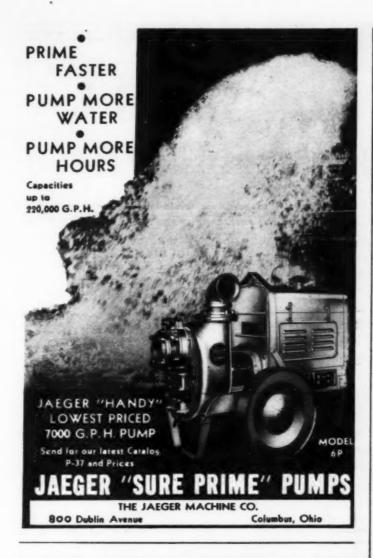
Illustrations from top to bottom as follows:

Pile Driver.

B. Stilling Basin Steel Works on Keystone Dam Project.

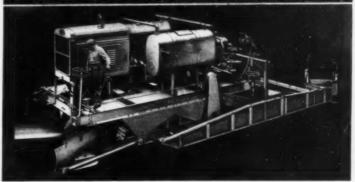
A. Construction of 180-foot Project, Northeast of Ogallala, Nebraska.

D. Three Model LI-600 Cummins Diesels Driving Gener-C. View of the Keystone Dam ators on the Keystone Dam. Dependable





The MODERN METHOD for LOW COST ROADS



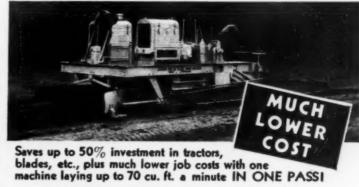
JAEGER Mix-in-Place ROAD BUILDER

Self-Propelled Mixing, Spreading and Finishing Machine for Heavy Retread and Stabilized Base





rough subgrade, spreading screw and screed lay a finished surface, ready for rolling—MIXED AND LAID IN ONE PASSI

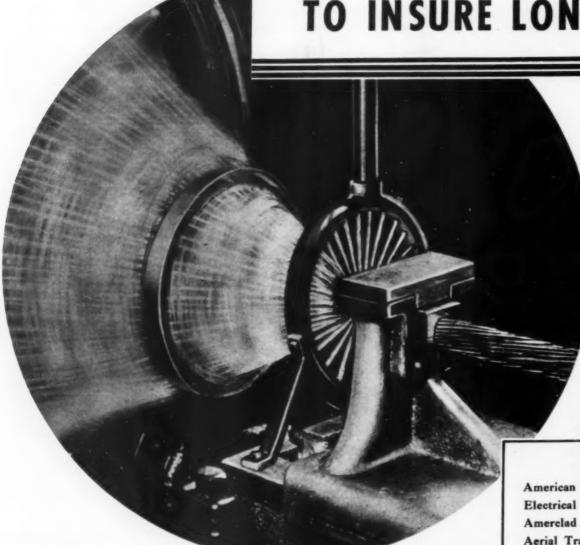


Also Built in Popular Priced Tractor-Drawn Model for Light Retread and Stabilization--For Full Details Send for Catalog MP-37.

HE JAEGER MACHINE CO. BOO DUBLIN AVE. COLUMBUS. OHIO

We lubricate EACH WIRE







American Tiger Brand Wire Rope Electrical Wires & Cables Amerclad All-Rubber Cables Aerial Tramways Tiger Wire Rope Slings Tiger Wire Rope Clips

DUBRICATION at each point of contact in wire rope is of equal importance to that in any complicated machines*. It reduces external wear, prevents corrosion, cuts down internal friction and enables each strand to move freely — all of which results in increased useful life.

Every wire of American Tiger Brand Wire Rope is carefully lubricated. This adds vitally to the flexibility of the rope, enabling it to withstand the terrific jerks of starting and stopping.

This lubrication is the result of years of engineering and field experience and is but one of the many different features which make American Tiger Brand Wire Rope a profitable operating investment for you.

American Tiger Brand Wire Rope is available in either Standard (nonpreformed) or Excellay (preformed) constructions.

^a Machines? Absolutely, wire rope is a machine. It fits perfectly the dictionary definition, "Any combination of mechanism for utilizing or applying power."

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York



COLUMBIA STEEL COMPANY

Russ Building, San Francisco

United States Steel Products Company, New York, Export Distributors

UNITED STATES STEEL

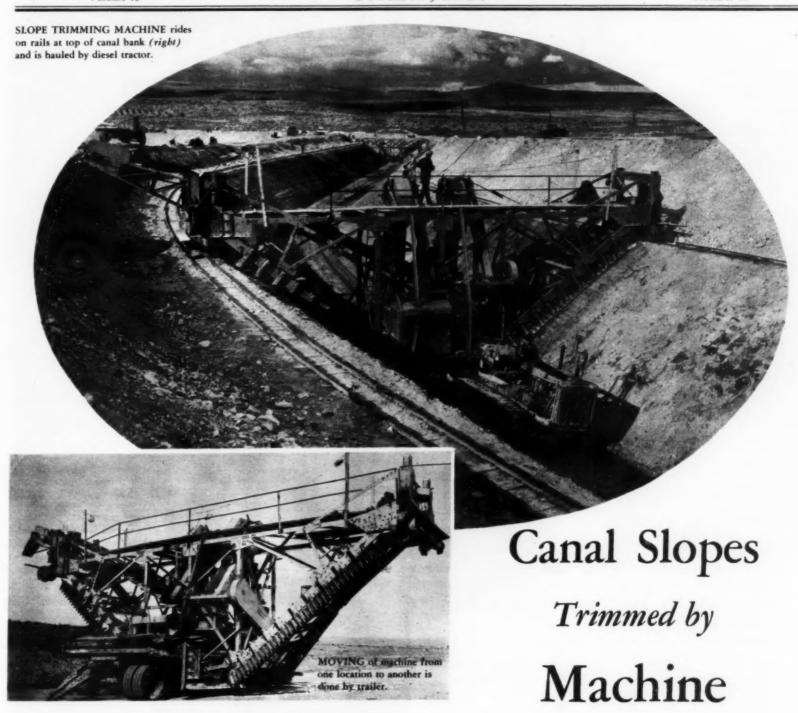
Construction Methods and Equipment

Established 1919 McGraw-Hill Publishing Company, Inc.
ROBERT K. TOMLIN, Editor

Volume 19

October, 1937

Number 10



ONCRETE LINING of the Roza canal, U. S. Bureau of Reclamation project 6 mi. north of Yakima, Wash., is facilitated by the preliminary operation of trimming the slopes to accurate line, prior to placement of concrete reinforcement, by a special machine, illustrated herewith, operated by J. A. Terteling & Sons, contractors, of Boise, Idaho. The canal

will serve the new Roza Division of the Yakima reclamation project, comprising 72,000 acres, for which C. E. Crownover is construction engineer for the Reclamation Bureau.

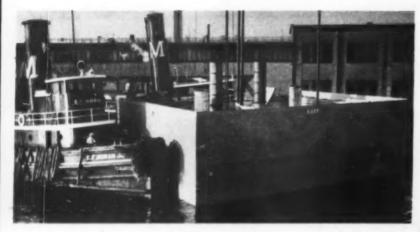
The canal prism has a base width of 14 ft., side slopes of 11/4:1, a water depth of 11:2 ft. and concrete lining extending to a height of 13 ft. The slope-trimming machine moves on rail-

road tracks laid along the banks at each side of the canal. It is hauled by a 75-hp. Caterpillar diesel tractor operating in low gear on the bottom of the excavated canal section. As the machine moves forward, fixed scarifier teeth loosen the soil on the rough side slopes while movable cutting blades trim the sides and bottom to accurate section. Earth spoil from the

trimming operation is raised from the canal bottom by a bucket conveyor and deposited upon an inclined belt conveyor which casts it to one side along the top of the canal embankment. The whole machine can be raised or lowered by means of jacks. Limited by the capacity of the belt conveyor, the maximum depth of cut made by the machine in good soil is 3/4 in.

This Month's

"MEWS REEL"

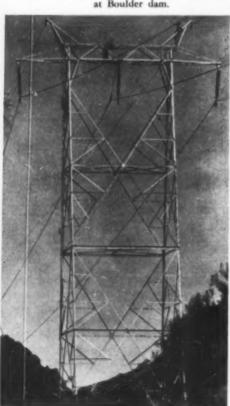


GOING DOWN!

Cutting edge section, weighing 600 tons, of pneumatic caisson for New York ventilating shaft of north tube of Lincoln (formerly named Midtown-Hudson) vehicle tunnel between New York and New Jersey, is floated to place for sinking by Mason & Hanger Co., New York contractor. Caisson section is 42x52 ft. in plan, 35 ft. high and is fitted with four air-locks. With sections added as sinking progresses, caisson ultimately will be about 100 ft. high.

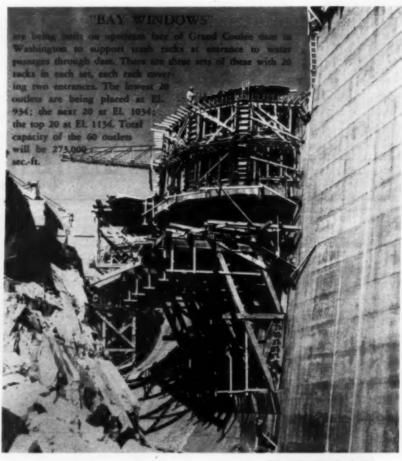
LAST TOWER

in 237-mi. transmission line (below) carrying power from Boulder dam to five pumping plants of Metropolitan Water District's Colorado River aqueduct in Southern California, is erected and final cable stretched July 26, eight months ahead of schedule. Carrying electrical energy at 230,000 volts, this giant electric system, involving 680 mi. of aluminum cable conductor, 30 mi. of copper conductor, and 940 steel towers, will eventually transmit 36 per cent of all firm power generated at Boulder dam.



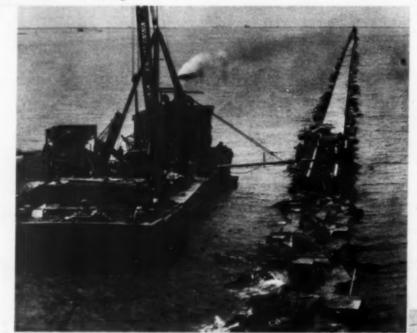
FOR LOUISIANA'S NEW BRIDGE

across Mississippi River at Baton Rouge timber mat 400x250
ft. (right) is assembled for sinking to river bottom, 80 ft. down,
to stabilize foundation material
at site of Pier 3. Inspecting operations (in white shirts and
trousers) are, at right, HARRY
B. HENDERLITE, state highway
engineer, and CHARLES W.
CUBBAGE, superintendent for
Kansas City Bridge Co.. contractor for bridge substructure.



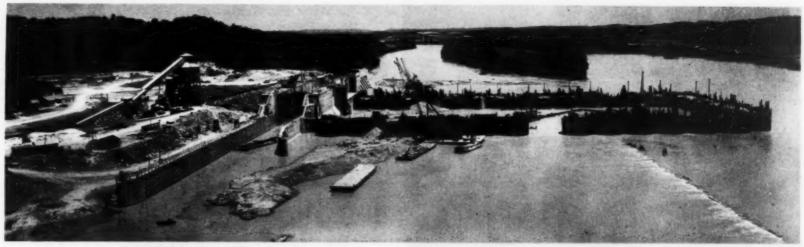
CONCRETE CAP

construction on east jetty below Port Arthur, Texas, in Gulf of Mexico (left), requires perfect coordination of wind, tide and floating plant used by D. M. Picton & Co., contractor, of Port Arthur. Working 5 mi. offshore to build cap 6 ft. above mean Gulf level, 10 ft. wide, and 6,900 ft. long, contractor takes 436 days to place about 6,900 cu.yd. of concrete, including delays caused by adverse weather. After sealing large stone with riprap and quick-hardening seal course, construction force places concrete in forms of 1x8-in, shiplap erected vertically to meet irregular rock contours. Federal government finances \$175,000 project, built under direction of U.S. Engineers.





October, 1937 - CONSTRUCTION Methods and Equipment



CHICKAMAUGA DAM

Tennessee Valley Authority project near Chattanooga, Tenn., begins to take form with completion of navigation lock and building of second cofferdam within which spillway section will be constructed. Dam, estimated to cost \$32,000,000, will have length of 5,685 ft. and maximum height of 104 ft. It is fifth in a series of dams on Tennessee River, starting with Pickwick Landing dam, at downstream end, and including Wilson, Wheeler, Guntersville and Chickamauga dams.



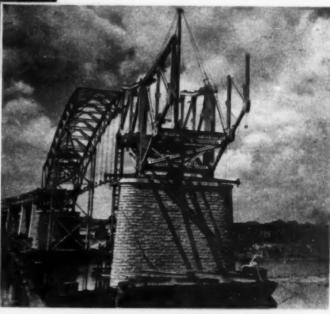
WHEELER DAM

(left) \$37,000,000 river navigation flood control and power project of Tennessee Valley Authority, was formally dedicated Sept. 10. Notables inspecting giant generating units after ceremony were (left to right above): Hon. William B. Bankhead, Speaker of House of Representatives; Dr. Arthur E. Morgan, TVA Chairman; Miss Annie Early Wheeler, daughter of General Joe Wheeler, after whom dam was named; Bishop Charles Clingman, of Louisville, Ky.; and David Lilienthal, TVA director.



THEME CENTER

of New York World's Fair of 1939 on Flushing Meadow, Long Island, is scene of ceremonies marking start of construction by H. Johnson & Son, contractor, of Flushing, N. Y., of pile foundations for Trylon, 700-ft. high obelisk, and 200-ft. diameter Perisphere, key buildings of unique architectural form to cost \$1,700,000 at center of exposition area. Job involves driving 1,177 piles in 59 days.



CONNECTICUT RIVER BRIDGE

at Middletown, Conn., reaches stage of steel erection by cantilever method for main spans. Structure 3,420 ft. long has plategirder approach spans supported by concrete piers on steel Hpiles and two 600-ft. tied steel arch spans carried by piers on 8½- to 11½-ft. diameter steel cylinders sunk 100 to 120 ft. by rotating caisson method. Contractors are: Merritt-Chapman & Scott Corp., of New York, for substructure (\$1,028,303): and Bethlehem Steel Co., Bethlehem, Pa., for superstructure (\$1,085,594).

Glass Blocks

Form Exterior Walls of

Office Building

FIFTH AVE. FACADE contains glass block area 12 ft. wide and 40 ft. high above ground floor shop of Steuben Glass Division.

RANSLUCENT, hollow glass blocks, 11¾ in. square and 4 in. thick, covering an area of about 3,800 sq.ft. and laid up in portland cement mortar with ¼ in. joints like face brick, form 80 per cent of the exterior wall surface, above the first floor, of the new 5-story air-conditioned office building of the Corning Glass Works, recently completed at the southwest corner of 56th St. and Fifth Ave., New York City, by Marc Eidlitz & Son, Inc., New York, build-





LAID UP LIKE BRICK in 1:1:3 mortar of waterproof portland cement, lime and sand, hollow glass block units, weig in 1-1 lb. each, are 1 ft. square and 4 in. in thickness.

OPTICAL FLUT-INGS (left) to prevent glare are molded on inside surfaces of dished halves of blocks which are fused together to form insulating air space within each unit.

ing contractor. In the new structure, designed by William & Geoffrey Platt and John M. Gates, architects, a total of 3,825 glass construction units, approximately 1 ft. square, are employed for the exterior walls, while interior partitions separating the various executive offices on the four upper floors involve the use of about 1,200 additional glass construction units of smaller size than those in the exterior walls. As shown in the accompanying illustration, the Fifth Ave. facade of the building, of which the ground floor and mezzanine will be occupied by the shop of the company's Steuben Glass Division, contains a glass block panel measuring 12x40 ft., while in the 56th St. wall the main structural glass area is approximately 80x41 ft., in addition

to three small panels just below the second floor level.

With a 27-ft. frontage on Fifth Ave., the new House of Glass, New York's first office building of its type, replaces an old brownstone-front structure built in 1870 and frequently remodeled since that date. After the old building had been razed by the Walsh Wrecking Co., the Eidlitz organization erected the new steel frame and Indiana limestone facing to inclose the glass block panels which were set with the aid of pipe scaffolding extending the full 5-story height of the building.

The glass block structural units, product of the Corning Glass Works, are hollow and weigh 14 lb. each. They are made of two dished halves of Pyrex heat-resistant glass, with an

Page 42

average wall thickness of 7/16 in., fused together at high temperature to produce a dehydrated air-insulating space within each block. The inside glass faces of each block are patterned with horizontal and vertical optical flutings to give a wide range of light distribution, without glare, and a changing decorative effect when viewed from different angles. The outside surfaces of the blocks are smooth, so that cleaning is easy. The design produces a high degree of transparency in addition to desirable thermal and sound insulating properties. The special heat-

glass block the whole wall of a building may transmit well diffused light and, at the same time, provide the insulation lacking in plate glass."

The glass construction units are shipped to the job in cardboard cartons, packed four to each carton. In handling and laying the 3,800 glass units for the walls of the Corning building only 8 blocks were broken. The workers employed for setting the blocks were selected from the contractor's regular masonry brick crew, and handled the 1-ft. square units without difficulty. For the joints between blocks



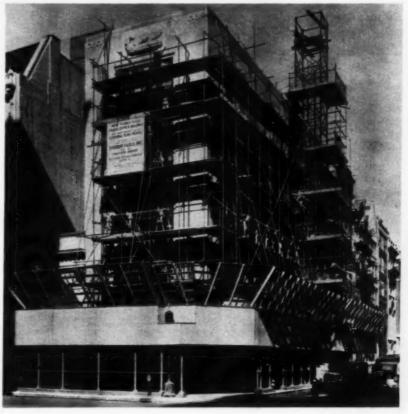
EXTERIOR GLASS SURFACES of hollow blocks are smooth, to facilitate cleaning, although interior surfaces carry horizontal and vertical flutings.

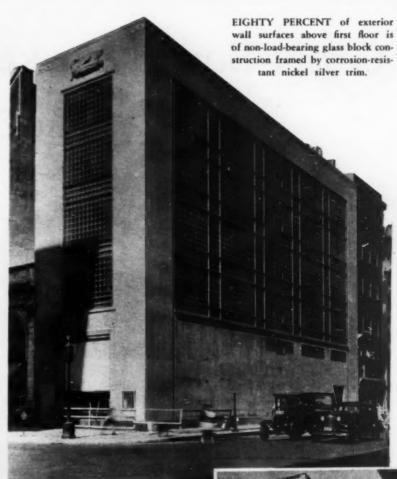
PIPE SCAFFOLDING (below) was carried to full five-story height of building in which glass block panels are inclosed by facing of Indiana limestone.

ORIGINAL BUILDING (right) on corner of Fifth Ave. and 56th St., which has been replaced by Corning's modern House of Glass.

resistant glass of which the blocks are built has a low lineal coefficient of thermal expansion, amounting to 0.0000018 for each degree of temperature between 66 and 662 deg. F., much lower than that of most metals and other materials of construction. The unit, although completely translucent, transmits 78 per cent of the light directed at one surface. The glass blocks have a heat transfer value of 0.5 B.t.u. per square foot per hour per degree F., as compared with a value of 0.6 for clay brick.

Questioned as to his opinion of the use of glass in buildings, William Platt, New York, architect said: "Among the problems that we have to contend with in the design of buildings in New York are dirt and noise. Air-conditioning, allowing windows to be closed and the building sealed, is one step toward solution. To reduce heat loss, however, windows have to be relatively small and that reduces light transmission. The recent development of the glass construction unit now makes possible an almost complete solution to the problem, for with





the mortar consisted of a 1:1:3 mixture of waterproof portland cement, lime and sand. Regulations of New York City's Board of Buildings limited. the size of individual glass block panels in exterior walls to 144 sq.ft. and to a height or width of 20 ft. The glass area in the Fifth Ave. facade is divided into panel units of 12x8 ft. maximum size and on the 56th St. wall the largest panel units measure 14x8 ft. The top and sides of each panel of units are protected with a cushioning material in the form of a mastic calking compound. The glass block panel units are not designed to support the weight of the structure

As shown in the pictures, the glass block panels in the exterior walls are separated by bands of nickel silver trim, a corrosion-resistant alloy of nickel, copper and zinc.

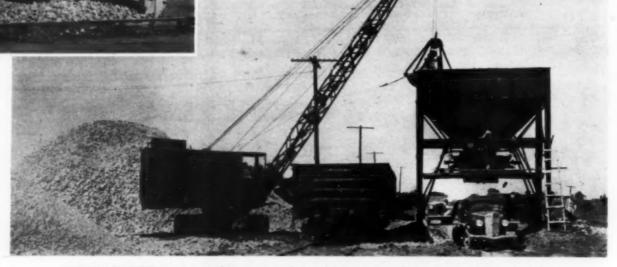
Grout-Bound Broken Stone Base

With Light Bituminous Surface

Provides Economical
Texas Pavement

THREE SPREADER BOXES cover full 24-ft. width of base between steel forms. Trucks hook on to spreader boxes and pull them forward while dumping.

ROPOSED AS AN economical pavement design for trunk roads carrying up to 3,000 vehicles per day, portland cement grout-bound broken stone base course surfaced with a light asphalt wearing course in the last 2 years has undergone its initial trial by the Texas State Highway Department on 11 mi. of state route 66 (U. S. 281), south of San Antonio. The grout-bound base on the 11-mi. section was built under two separate contracts, of about equal lengths, by the Briggs-Killian Co., of Pharr, Tex. So satisfactory have been the results obtained on the test section that the Highway Department this year awarded a contract for a much longer section of similar construction near



WEIGHT BATCHING of crushed limestone rock for 10-in. grout-bound base assures uniform 4-cu.yd. truck loads. Economical plant set-up utilizes long-boom crane operating on opposite side of railroad track from bins.

TEMPLET (right) riding on steel forms and carrying set of strap hinges checks profile of loose stone.





PAVING MIXER of 1-cu.yd. capacity operating on road shoulder mixes and distributes mortar for grout-bound base. Rolling with three-wheel 6-ton roller discloses low spots, which are filled with small stones.

Fort Worth. On the original project, where bid prices ran somewhat high because of the contractor's lack of familiarity with this type of construction, 10-in. grout-bound base on a 3-in. compacted subgrade of salvaged material was built for a total contract cost of \$1.36 per square yard. The asphaltic course, 1 in. thick, was added by state forces.

Pavement Design—Utilizing material from the asphalt-treated gravel surface of the existing road, the contracts called for the salvaging of the mineral aggregate in this surface and for placing the material in a 3-in. compacted layer in the bottom of a trench excavated to a total depth of 13 in. below profile grade. The trench was made 24 ft. wide to receive a groutbound base course of this width, and the bottom of the trench was shaped to a 1½-in, parabolic crown conforming with the crown of the completed base.

On top of the 3-in. compacted subgrade of salvaged material, the design provided a 10-in. base course of crushed rock filled with cement grout by penetration from the surface. The specification for the crushed rock required that 100 per cent of the material pass a 4-in. screen, 30 to 60 per cent be retained on a 3-in. screen, and 90 to 100 per cent on a 2-in, screen.

For the grout used in the base course, a 1:5 cement-sand mixture proved satisfactory for broken-stone base to be surfaced with an asphalt topping. The specifications for the fine aggregate used in the grout required that 100 per cent of the material pass a \(^1\)_8-in. screen, 90 to 100 per cent pass a \(^1\)_4-in. screen, and 90 to 100 per cent be retained on a 100-mesh sieve.

It was proposed originally that the

road forms be set in place along the two edges of the trench prior to construction of both the 3-in. compacted subgrade and the 10-in. grout-bound base. Although the first contract contained no provision for a center-line parting strip in the base, a wooden parting strip was used for about 2,000 ft. As a result of experience on this section, the second contract called for installation of a metal parting strip throughout its length. The design provided no expansion joints in the



MULTI-HOLED DISTRIBUTOR BOX at end of chute deposits grout on broken stone base, where it is worked into voids by hand brooming.

AFTER INITIAL GROUTING, mixer returns to spread thin mortar course which is uniformly distributed by hand screeding.

10-in. base be constructed in two 5-in. courses to assure complete penetration of the grout. Prior to the start of actual construction on the project, a test section (consisting of a sidewalk at the State Highway Department's division headquarters in San Antonio) was built to study vari-

grout-bound base. Construction joints were formed at the end of each day's run and at any other point where a delay of 1 hr. or longer occurred during the day.

Grout Control—For proper design of the grout mixture, the highway department engineers used the flow cone the remainder of the pavement inside of header forms set in the base to separate the test units from the surrounding grout-bound stone. Cores also were drilled and removed from the base to permit inspection of the grout penetration. The cores were broken in testing machines to determine the compressive strength of the grout-bound base.

Asphalt Surface Course-On top of the 10-in. grout-bound base the design called for a 1-in. asphaltic concrete course built to a width of 20 ft., with an additional 12-in. bevel at each edge, leaving 1-ft. strips of light-colored base to serve as traffic guides along both edges of the pavement. Although the base was finished to a 11/2-in. parabolic crown, the design provided a 1-in. parabolic crown on the asphaltic concrete course. The purpose of this asphalt course was to provide a smooth riding surface by filling all irregularities in the base, while at the same time protecting and preserving the grout-bound broken-stone course by taking the wear of traffic. To as-



BEHIND FINISHING MACHINE traveling on steel road forms, surface is floated and straight-edged by hand finishers.

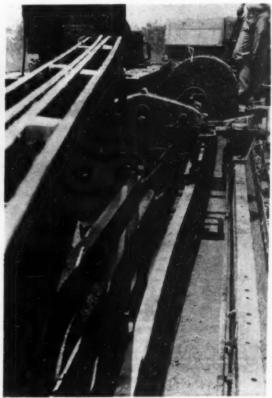
ous methods of construction. Work on the test section showed that full penetration of the grout could be obtained without difficulty in this gradation of stone for the full 10-in. depth. Accordingly, the grout-bound base of the 16-mi. section was built to full 10-in. depth in one operation.

Specifications required that steel

method of control. A 20-sec. flow gave the most satisfactory results with the sand used on this project. This flow required about 18 gal. of water per sack of cement for the 1.5 mixture

Other tests carried out on the project made use of slabs and beams placed and finished in the normal way with

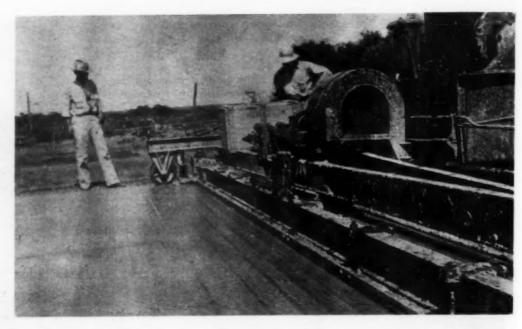
TAMPING ACTION (right) of finishing machine is only mechanical operation used on straight stretches of roadway.



sure strong bond between the base and asphaltic wearing course, the surface of the base was scratched with garden rakes to form shallow corrugations.

As the first step in the construction of the asphaltic wearing course, the surface of the grout-bound base was given a tack coat of cut-back oil applied at the rate of 0.1 gal. per square yard. The 1-in, asphaltic concrete course then was built in two layers. In the first layer the State Highway Department spread and rolled prefluxed limestone rock asphalt, uniformly graded from \(^1/8\) in. down, at the rate of 50 lb. per square yard. For the second layer, the department

ON CURVES (right) where base is constructed with straight superelevated crown, rear screed of finishing machine is used instead of tamper.



DRILLED CORE
HOLE (left) in
grout-bound base exposes broken-stone
aggregate. With
aid of mirror, camera records condition of full circumference of hole.

terial then was placed and compacted to 3-in, depth.

Stone Spreading — For the base course, the contractor preferred to use commercial crushed limestone shipped in by rail rather than local sandstone permitted by the specifications. The crushed rock was loaded into 1½-ton trucks, equipped with dual rear wheels, from overhead bins and hoppers of a

HAND RAKING

(left) forms surface corrugations

in grout-bound base

to provide better

top course.

d with asphalt

batching plant which weighed out uniform 4-yd. loads for the trucks. Three spreader boxes traveling on the subgrade distributed base stone to the full 24-ft. width of roadway. The two outside boxes were of uniform width, while the center box was of slightly greater width than either of the other two. Gates of the boxes were set to provide a uniform depth of stone in a definite distance with a 4-yd. load discharged from a truck. The two outside boxes were kept abreast, and the center box was kept one load behind them.

Immediately after spreading, the loose stone was harrowed by a heavy V-shaped harrow equipped with teeth long enough to reach 5 to 7 in. below the surface. The harrow broke up nests of fines and allowed them to settle to the bottom of the broken stone course. A scalping screen in the loading chute at the commercial stone plant eliminated most of the trouble with fines. After harrowing, the stone was

applied and compacted 50 lb. per square yard of a mixture comprising 80 to 85 per cent crushed stone, 15 to 20 per cent asphalt-coated sand, and 4 to 7 per cent asphaltic oil.

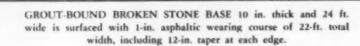
Subgrade Construction—As developed by the contractor, the most satisfactory method of salvaging the existing surface material proved to be (1) to remove the material from about 2,000 ft. at the start of the job and stockpile it outside the roadway section, thus making way for subgrading and form setting, and (2) to salvage the old surfacing ahead and haul it back for placing on the prepared subgrade. This sequence of operations was repeated throughout the job.

In removing old surfacing, the material was scarified and bladed into windrows. An elevating grader with a special plow loaded the salvaged material from the windrows into the trucks. This method proved satisfactory for salvaging useful mineral aggregate without picking up objectionable material.

After setting standard steel forms to final grade along the two edges of the trench, the contractor fine-graded 13 in. below the top of the form to proper cross-section. The salvaged ma-

FLOW CONE TEST (right) checks fluidity of grout for penetration purposes.





October, 1937 - CONSTRUCTION Methods and Equipment

EOUIPMENT

SUBGRADE AND SALVAGED MATERIAL

- 1 30-hp. tractor 2 50-hp. tractors

- elevating grader 8-ft. blade grader 10-ft. blade grader 12-ft. blade grader subgrade machine

- 5-ton roller
- trucks
- 5 fresnos

BROKEN STONE BASE

- 1 6-ton roller
- 3 spreader boxes 7 11/2-ton trucks

GROUTING OPERATION

- 1 1-yd. paving mixer 1 finishing machine
- CURING AND FORM PULLING 1 set of hand tools

STONE PLANT

- crane batching plant
- SAND PLANT
- 1 crane 1 batching plant

LABOR	Hourly
Classification	Wage Rate
SUBGRADE AND SALVAGE	D MATERIAL
1 grade foreman	\$0.50
1 team foreman	
1 form foreman	
3 grader operators	
3 tractor operators	
1 roller operator	
4 truck drivers	
5 teamsters	0.35
8 form setters	

Di	CUR	.85	14	-	3		U	2.0		le:	A	-	m.	36	D.		
forem	an								0	0			0				0.35
roller	op	eı	re	to	H		0	0	0	0	0		0		0	0	0.50
stone	gra	nd	le	E	1	0			0	0		a			0	0	0.35
	forem roller dump	foreman roller op dump m	foreman . roller oper dump mer	foreman roller operadump men	foreman roller operate dump men .	foreman roller operator dump men	foreman roller operator dump men	foreman roller operator . dump men	foreman roller operator dump men	foreman roller operator dump men	foreman roller operator dump men	foreman	foreman	foreman	foremanroller operatordump men	roller operator dump men	foreman

	GROUTING OPER	R/	17	rı	0	N	
ı	foreman						0.50
	paver operator						
	fin. mach. operator						
2	master finishers			0			0.50
ı	skin man						0.35

..... 0.35

2	stone	cas	ite	rs .							0	0			0.35
2	edgen	s-ri	ake	:18			0		0	۰	0	0	0	0	0.35
(CURING	A	ND	F	08	l M	Æ	1	PI	U	L	L	11	N	G
1	forem	an			0 0	0				0	0	e	0		0.50

	STONE PLANT	
1	crane operator	0.75
	oiler	
2	car men	0.35
	bin operator	

			S	A	ı	4	D		F	'n.	A	1	61	r			
1	crane	01	p	e	F	B	te	H						0	0	0	0.75
1	oiler					67						0				0	0.35
	car m																

COLD - MIX AS-PHALTIC CON-CRETE SURFACE (right) 1 in. thick is built up in two layers, each of which is spread by motor patrol grader prior to rolling.



TEST SECTION placed and finished with rest of base is removed from pavement for inspection. Bottom of test slab, after brushing, reyeals depth of grout penetration.

shaped and graded by hand; blading proved impractical for this service with the large-size stone. A templet equipped with strap hinges was used to check the surface of the loose stone.

Initial rolling of the loose stone consisted of one or two passes in a longitudinal direction. After a sec-

ond templet check, the stone was given a final rolling until it was well keyed without crushing. For the soft grade stone used, a 6-ton three-wheeled roller proved most satisfactory, as it allowed gradual keying without breaking.

Grouting Operation - A 1-cu.yd. paving mixer traveling on one of the earth shoulders outside the roadway section mixed the grout and deposited it on the broken stone through a multiholed distributor box at the end of a long chute. The stone was kept moist ahead of the grouting, and the grout was deposited on stone already grouted and was broomed ahead into the voids. leaving no excess mortar on top. After about 100 ft. of the base had been grouted and thoroughly broomed, the 6-ton three-wheeled roller compacted the stone. At this time, low spots which developed under the roller were built up with stone of 1- to 1/4-in. size. After compaction, the surface presented a mosaic appearance, with the stone extending about 3/8 in. above the grout. High stones were tamped by hand.

After this initial grouting operation, the paver moved back to the beginning of the 100-ft, strip and deposited a thin layer of mortar containing a reduced amount of water. This thin layer of mortar was spread uniformly over the surface in preparation for the finishing.

Base Finish-For the finishing operation, the contractor used a conventional-type finishing machine, operating on the steel forms, with the front screed removed.. Only the tamper of the finishing machine was used on tangent, where the base had a parabolic crown, and only the back screed was operated on superelevated curves, where the surface was given a straight crown. It was necessary to dispense with the front screed because this screed had a tendency to dig out the large stones. The machine operated in accordance with the usual method of final finish as practiced in concrete paving, but the operation was somewhat delayed because of the high water content of the mortar.

Ordinarily the finishing machine made three trips over the surface of the grout-bound base. The first trip showed up the low spots, which were built up with filler stone before the machine made its second pass. Floats and straight-edges were used by the hand finishers immediately behind the finishing machine. Before the grout took its final set, the surface was scratched lightly with a hand rake. Wet burlap curing was required for 72 hr. The base was opened to traffic at the end of 14 days.

Progress-Using the equipment and labor indicated in accompanying tables, the contractor completed an average of 789.5 lin.ft. of base 24 ft. wide per 10-hr. day. This progress was equivalent to 582.4 cu.yd. or 2,105.3 sq.yd. of pavement completed in 10

Administration-Under the general direction of Gibb Gilchrist, state highway engineer, the pavement was designed and built by J. G. Rollins, who was at that time division engineer of Division 15, San Antonio, with James V. Curnutte as resident engineer on the project. The contractor for the 11 mi. of base construction was the Briggs-Killian Co., Pharr, Texas.



AFTER ALMOST 2 YEARS of service under traffic, road exhibits satisfactory condition with smooth riding surface.

Judicious Handling of Labor

STRADDLING LINE ahead of ditch, trench hoe handles 41-ton pipe section into position in wire rope sling.



FLAT-BED TRUCK TRAILERS haul 16-ft. pipe sections weighing almost 4½ tons from pipe plant to point on highway nearest right-of-way. Use of ladder-type trencher soon was discontinued because of large amount of rock encountered.



PNEUMATIC-TIRED CARRIER, of steel frame construction, drawn and operated by diesel-tractor, transports pipe sections from point of delivery to final location along water supply line.

Speeds Progress on Water Supply Line

N A PWA PROJECT requiring the hiring of all labor through the National Reemployment Service, S. E. Evans, Fort Smith, Ark., by intelligent selection and generous encouragement of trenching and pipe-laying crews built up a loyal and ambitious organization which made excellent progress in constructing a 32.4-mi. water supply line for Little Rock, Ark., under subcontract with the Lock Joint Pipe Co., Ampere, N. J., general contractor. Two trenching and pipe-laying crews, each equipped with a trench hoe, laid 100 sections 16 ft. long of 39-in. internal diameter steel core reinforced-concrete pipe per day. This rate of progress rapidly used up a reserve stock of pipe at the general contractor's manufacturing plant, in Little Rock, which had a capacity of 50 joints per day.

In hiring men for his pipe-line crews, Mr. Evans requisitioned common labor only from the National Reemployment Service and advanced capable workmen from the ranks to positions as foremen and mechanics. This method of building up the crews encouraged ambitious workers by making it evident that energetic and effective labor would be promptly recognized and rewarded. As a result of his practice of promoting good workmen and rewarding them with higher pay, Mr. Evans developed two crews distinguished by their teamwork, loyalty and ambition. Working on individual sections of the line, the crews developed a natural spirit of rivalry which led them to make great efforts to produce the best daily and weekly progress records.

Pipe Line-Traversing rolling country for 32.4 mi. between Little Rock and the hills to the west, the new water supply line will bring soft water into the city to replace the present supply of hard, chemically treated water drawn from the Arkansas River. A rolled earthfill dam at the upper end of the pipe line now is under construction as part of the comprehensive water supply project. Because of rises and falls in the pipe line, hydrostatic pressures along the route range from little more than zero to almost 350 ft.

Each pipe section contains a cylindrical steel core of welded plate and a cage of reinforcing wire incased in walls of dense concrete. Weight of the 16-ft. sections ranges between 41/4 and $4\frac{1}{2}$ tons. Joints, of bell-and-spigot type, are sealed with rubber gaskets and filled with mortar.

Rock was encountered along almost the entire length of the line. Of the total excavation, nearly one-half was rock. Minimum cover of 18 in. over the pipe was specified. The contract permitted this cover to be placed in the form of a mound over the pipe line where the top of the pipe ex-



RUBBER GASKET is slipped on spigot end of pipe just before joint connection is made.

tends above the surface of the ground.

Ditching and Pipe Laying-Two wagon drills mounted on a sled drawn by a tractor-compressor unit sank blasting holes in rock sections of the line. The row of holes put down by this outfit were shot to break up the rock to desired trench width and depth for ready excavating by a trench hoe. This excavating unit ordinarily straddled the line in advance of the trench and set pipe sections as rapidly as it completed trench excavation. As each joint was made, workmen slipped a rubber gasket on the spigot end of the pipe just before it was lowered into the bell end of the pipe already laid. Other men, following closely behind the pipe-laying force, filled the joints with mortar. The trench was backfilled by hand and tamped up to the springing line of the pipe. A tractor-bulldozer completed the backfilling.

These methods, typical of the construction practices followed by each crew, were modified where necessary, as at a creek bottom crossing illustrated by an accompanying photograph. At this point the contractor dug and drained a long section of trench before laying pipe. Other photographs accompanying these notes illustrate typical trenching and pipe laying methods.

Progress—Following award of the pipe-line contract to the Lock Joint Pipe Company for \$1,562,682.72, order to proceed with the work was given July 26, 1936. The first pipe was laid in the trench by S. E. Evans on Oct. 2, 1936. Despite delays caused by winter weather, the pipe laying contractor used up the reserve stock at the pipe plant by May 15, when 23 mi. of line had been completed. After that date the contractor operated only one machine to keep pace with the plant capacity of 50 pipe sections per day, finishing the line in July.

During the initial period of several weeks in which the two crews maintained an average of 100 pipe joints



COMPRESSOR (left) driven from power take-off on tractor supplies air to operate two wagon drills on trailer sled.

PIPE LAYING (above) advances with trench excavation, trench hoe placing 16-ft. joints as rapidly as ditch is opened.



Overman photos

CONCRETE COLLAR (left) around pipe joint at sharp change in grade at top of rise is built with concrete delivered by truck mixer

ROCK EXCAVATION (above) is handled by trench hoe after row of holes has been shot on trench line.

per day, each crew operated two 8-hr. As daily progress began to exceed this average, the contractor reduced one unit to a single 10-hr. shift per day. A 5-day week was in force throughout the construction of the pipe line.

Two Tunnels-Not far from the intake of the water supply line are two tunnels, aggregating slightly more than 2,500 ft. in length, driven under subcontract by Salmon & Cowin, Inc., Birmingham, Ala. The tunnels were excavated to 5-ft. 9-in. circular section in slate strata which varied from hard to soft and required careful shooting to prevent overbreaks. For this reason the contractor pulled an average of only 4 ft. per shift to avoid overloading.

Each drilling round consisted of a center hole and a circle of holes drilled with a 45-lb. wet jackhammer mounted on a rotating arm which turned on a horizontal shaft supported by a vertical post. The contractor ran four 61/2-hr. shifts per day at each face, the drillers moving in to trim out and prepare exploders 1 hr. before the muckers left. Each mucking shift loaded about seven 32-cu.ft. mine cars. The drilling shift drilled and blasted

in about 41/2 hr.

Tunnel No. 2, 1,068 ft. long, was holed through while the contractor was driving a single heading for a distance of 600 ft. from the west portal of adjacent Tunnel No. 1, 1,465 ft. in length. A shaft then was sunk 350 ft. from the east portal, and the contractor continued driving Tunnel No. 1 at three faces. Small air hoists set up at a headframe between the tunnels and at the shaft lifted loaded muck cars to 24-in.-gage disposal track running to the dumps. Double blocks reeved with 3/8-in. wire ropes were used to hoist the cars.

Air for all tunneling operations was supplied from a single two-stage aircooled compressor of 210 c.f.m. capacity installed in a shed between the tunnels. In addition to drills and hoists, the compressor furnished air to an air-driven centrifugal sump pump.

Tunnel Lining-Before the end of June, Salmon & Cowin, Inc., had completed lining No. 2 tunnel and had half finished the lining of No. 1, using a single-piston Pumpcrete machine. The lining consists of reinforced steel cylinder concrete pipe, laid to line and grade, with the space between the outside of the pipe and the line of excavation completely backfilled with 2,000-lb. concrete.

As the first step in the lining procedure, the contractor carefully aligned and graded rails in the tunnel a definite distance below the pipe invert and grouted the rails in place in a concrete mat about 6 in. thick. Six joints of pipe were placed in about 4 hr.



DUAL WAGON DRILLS mounted on sled drawn by tractor put down blasting holes along line of trench.

each afternoon; and concrete backfill was pumped around these pipes in about 41/2 to 5 hr. on the following morning.

Pumping proved entirely satisfactory after minor difficulties had been overcome at the beginning of the operation. An unsuccessful attempt was made to use slow-setting cement. For some reason this cement would not hold sufficient water to give a plastic



IN WATER-BEARING SOIL of bottom land at creek crossing trench hoe lays pipe after ditch has been excavated and drained.



HILLY TOPOGRAPHY at several places calls for sharp changes in gradient.

HEADFRAME in open cut between two tunnels is equipped with air hoist to raise loaded mine cars to disposal track.

mix without having water separate from the concrete in the pumping process and cause clogging of the discharge line. After that experience ordinary cement was used without further difficulty, although a fairly low yield per sack of cement was necessary to obtain concrete which would pump. The contractor pumped up to a maximum of 750 ft. Near the heading an air nozzle was tapped into the discharge line. After about three strokes of the pump, concrete which had passed the nozzle was blown into its final position with air, assuring complete filling of the space around the pipe.

Direction-Design and construction of the new water supply project for Little Rock, Ark., are directed by the Burns & McDonnell Engineering Co., Kansas City, Mo. Marion L. Crist, resident engineer, is in charge of all operations on the project for this consulting firm and for its client, the City of Little Rock. Work on the pipe line is directed for the Lock Joint Pipe Co., Ampere, N. J., by L. G. Wilhelm, general superintendent. S. E. Evans, Fort Smith, Ark., is subcontractor on pipe line construction. At the tunnels, George M. Brown, superintendent, is in charge for Salmon & Cowin, Inc., Birmingham, Ala.



SAFETY NET

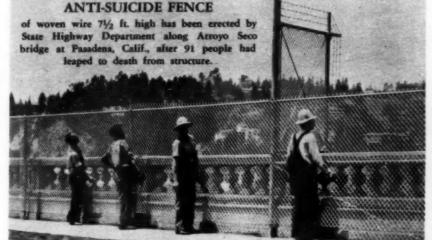
protects squad of workers engaged in first repainting of steelwork on George Washington bridge across Hudson River, New York City.

A MONTHLY PAGE OF Unusual Features of Construction

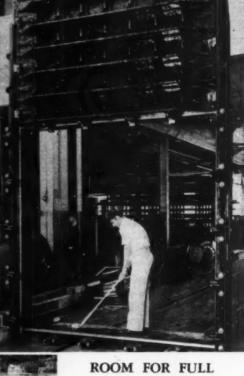
SEA-GOING SHOVEL

working in water up to level of operating floor clears Truckee River of boulders as preparation for construction of Sierra St. bridge at Reno, Nev.

Gosh! I bet that's thrillin'!



CONSTRUCTION Methods and Equipment - October, 1937



SWING

is afforded golfer teeing off within 9x9-ft. opening of one of thirty big sluice gates being supplied by Crane Co, for sewage treatment plant at Buffalo, N. Y. Weight of sluice gate is 14,700 lb.



AGGREGATE HANDLING PLANT at Guntersville Dam. Construction of lock is nearly completed.

New Type of Aggregate Stacker

A T GUNTERSVILLE DAM, now under construction by the Tennessee Valley Authority on the Tennessee River, 74 mi. above Wheeler Dam, a novel large capacity aggregate storage and reclaiming system has been developed and has effected substantial economies in the procurement of the 500,000 tons required for the construction of the dam. The dam is to be built in three stages through

ing plant is being used during all stages of construction.

Aggregate Produced by Dredging— The aggregate is produced under contract by a 16-in, diesel-electric hydraulic dredge pumping from the river and discharging through a floating pipe line to a floating screening plant which grades the material to five sizes and loads it on barges. The barges are then towed to the unloading dock

Developed at

Guntersville Dam

at the dam site. By providing for a large storage capacity of 200,000 tons, enough for any one of the three construction stages, it was possible to obtain a substantial reduction in the bid prices for aggregate production. With large storage provisions the contractor can operate his plant at maximum efficiency when conditions of river are favorable and suspend operations under unfavorable conditions, thus reducing the operating cost of his plant. His plant can produce aggregate faster than the job can use it and, as

there will be several months between concreting operations in the three stages of construction, he can build up the storage to capacity and move his plant to other work, resuming deliveries when the storage is reduced to 50,000 tons. This further reduces the cost of production as it reduces the length of time the plant is tied up on the job. The contractor plans to produce aggregate as rapidly as possible and leave the job when enough is stored to finish the first two construction stages. He will return early

RADIAL STACKER AND RE-CLAIMER, revolving about center of five-leaf clover, provides 200,-000-ton aggregate storage.

a three-year construction program which started January, 1936, with the construction of the navigation lock, requiring 125,000 cu. yd. of concrete, on the north bank. The second stage involves placing 73,000 cu.yd. of concrete in the spillway adjacent to the lock. The power house and intake structures and the remainder of the spillway will be constructed near the south bank during the third stage and will require 110,000 cu.yd. of concrete. A fixed aggregate handling and concrete mix-



STACKER is viewed from top of timber bins, with unloading crane and hopper at left, stacker boom and storage piles in center foreground. Mast and reclaiming conveyor are at right.

in 1938 to finish up production for the third stage.

Loaded barges are delivered to a timber crib mooring dock near the north bank directly downstream from the dam site and are unloaded by an electric revolving crane with a 95-ft. boom handling a 2-cu.yd. clamshell bucket. The crane is mounted on a wide-gage railroad track carried out over the river bank on timber pile bents. As the track approaches the dock at an angle of about 60 deg., it is possible, by moving the crane along the track as required and properly adjusting the boom, to unload the barge

in place without "booming" the crane

with a load. Aggregate is delivered by the crane to a 150-ton-capacity hop-

per equipped with a gate which controls the discharge from the hopper

to an open pan vibrating feeder. The feeder regulates the flow of aggregate

to the 30-in. belt conveyor, 443 feet

long, which discharges to the storage

tem provides for the storage of 200,-

000 tons of aggregate in a circular

Special Stacker-The storage sys-

system.



AGGREGATE COMES IN by conveyor from left, and either drops into hopper or passes through flap gate and thence out stacker boom.

RECLAIMING HOPPER (left) at end of stacker boom receives load from clamshell bucket.

area approximately 500 ft. in diameter in stock piles divided into five sections by wooden barricades extending radially outward from the center. At the center, the 113-ft. mast of a 50-ton guy derrick is mounted vertically on a special concrete pedestal and is

held in position by long guy cables from the top of the mast. The boom of the guy derrick has been replaced by a special boom which carries a 30in. reversible belt conveyor 160 ft. long, driven by a 40-hp. electric mo-This boom-mounted stacker conveyor is supported at the mast end by a specially designed 22-ft. bull wheel which is equipped with rollers operating on a circular rail. Supported at the outer end by a nine-part regular boom line through equalizing yokes attached to the outer half of the boom at two points, the boom is capable of 22 deg. of vertical angular movement. A 100-hp. electric hoist lifts the end of the boom as required, and a 30-hp. electric slewer rotates it into position over the proper storage pile.

All conveyors carrying material directly from the unloading operation have a capacity of 400 tons per hour, the estimated maximum delivery capacity of the contractor's plant.

Storing and Reclaiming-Aggregate



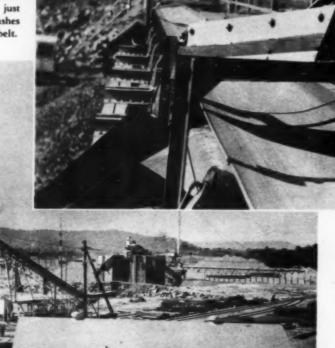
ELECTRIC REVOLVING CRANE with 2-yd. clamshell bucket unloads aggregate from barges and dumps it in unloading hopper, where it is discharged to belt conveyor in left foreground.



CHUTES DELIVER AGGREGATE to reclaiming conveyor which passes under pedestal base of stacker and carries material to timber bins at left.

delivered by the conveyor from the unloading dock to the storage system is dumped into a circular hopper built around the mast. The hopper has a chute with a flap gate at the end that can pass the material to the stacker boom or to the main conveyor system at the base of the mast, in which case the storage system is bypassed and

DETAIL (right) of discharge chutes at side of stacker boom. Inclined steel plate just above belt pushes material off belt.



MIXING PLANT and cement silo. Live storage bins and stacker appear in background.

Dam is held by the American Aggregates Corporation, Greenville, Ohio. The stacker boom was furnished complete by Barber-Greene Co., which also furnished all mechanical equipment for the entire belt conveyor system. The guy derrick used, including special bull wheel and appurtenances, was built by American Hoist and Derrick Co.

The general plant layout and the special storage system were devised by A. J. Ackerman, construction plant

the aggregate goes direct to the mixer Aggregate going to storage plant. flows through the hopper chute to the stacker boom conveyor, is carried out over the end of the boom and is discharged to the proper pile: Plows, placed along and above the belt, can be dropped down on the belt to divert the aggregate from the conveyor at various points along its length; this permits filling in the area close to the mast. The outer end of the boom is adjusted to be just above the storage pile to reduce the breakage and segregation which occurs when rock drops through long distances.

When aggregate is needed from storage, a 11/2-yd. crawler crane with a 1-yd, clamshell bucket takes the material from the stock piles and dumps into a small hopper at the end of the stacker boom. The movement of the conveyor belt in the boom is reversed and the aggregate is carried back to the mast where it is chuted through the mast foundation to the belt conveyor serving the mixer plant. This conveyor is 30 in. wide, 300 ft. long, has a capacity of 400 tons per hour, and runs to a small hopper in the center of a group of five octagonal timber crib bins which provide about 2,300 tons of live intermediate storage capacity, enough for one day's production of concrete. By drawing aggregates from these bins as required during a day, the intermittent requirements at the mixer plant are made independent of the unloading and

FROM STORAGE
PILES (left) aggregate passes to
group of five octagonal timber crib
bins. Belt conveyor
carries material
from these bins to
mixing plant.

storage operations. A 25-ft. arm of 30-in. conveyor pivoted under the hopper can be swung over any one of the storage bins for filling. Each bin, carrying one of the five sizes of sand and gravel, is provided with a gate at the bottom through which material flows to a 24-in. belt conveyor leading to the mixing plant. This conveyor is 520 ft. long and has a capacity of 200 tons per hour.

Mixing plant bins have a combined capacity of 500 cu.yd. Close control of deliveries to the mixing plant is necessary, and the gate operator at the live storage bins is instructed by the mixing plant operator as to what material is required.

Conveyor Controls-All conveyors in the system are electrically driven and controlled. Special interlocking controls make it impossible to operate a conveyor unless the conveyor ahead also is operating; this feature prevents material piling up on a stationary belt. The interlock controls operate two systems independently, one system comprising all conveyors from the unloading hopper to and including the stacker boom conveyor, the other comprising the conveyors from the storage plant to the live storage bins. The controls are arranged also to allow bypassing the storage plant.

A contract for production and delivery of aggregates for Guntersville engineer, and designed by the engineers of the TVA Construction Plant Division. L. A. Schmidt, Jr., developed the design for the central concrete base.

Arthur E. Morgan is chairman of the Tennessee Valley Authority. Carl A. Bock, assistant chief engineer, is in direct charge of the engineering and construction on TVA dams. T. B. Parker is chief construction engineer; Ross White, general construction superintendent; C. H. Locher, construction consultant. For Guntersville Dam, Verne Gongwer is project engineer; G. K. Leonard is construction engineer; and G. P. Jessup is construction superintendent.



LONG-REACH LOCOMOTIVE CRANE, with gooseneck boom measuring 105 ft. in length, belps Virginia Bridge Co. make rapid progress on steel erection for Tennessee Coal, Iron & Railroad Co.'s big new tin plate mill in Birmingham, Ala. Plant for U. S. Steel Corp. subsidiary, nearing completion, will have annual capacity of 200,000 tons of finished tin plate and will employ 2,500 men.

OFYOUR I DONE AT I

BUY TRACTORS THAT Excel ON THIS 90% OF YOUR WORK!

Sit on the bank and time the operation of a tractor and scraper. Note what a small percentage of the time is spent in loading—what a large per cent is actual hauling. Note too that by far the greater percentage of the tractor's work is done in the higher speeds. In recognition of these facts, Allis-Chalmers gives you two basic advantages in tractor design: (1) More and higher speeds to increase your daily yardage and reduce your cost per yard. (2) Proper BALANCE between power, speed and weight to assure maximum performance in the higher speeds. That is why Allis-Chalmers has eliminated "dead load" weight - extra weight saved means extra payload gained. You get quicker pick-up,



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IRACTOR WORKIS THE HIGHER SPEEDS...

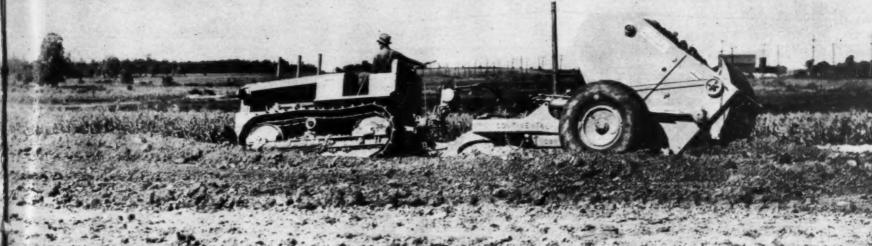


POWER FOR LOADING; SPEED FOR HAULING

This heavy, mucky soil is on the James Spencer & Sons Co. job near Houston, Miss. The "L-O" has ample power to load the 10-yard Gar Wood Scraper—also speed to cut down traveling time on the 800-foot haul.

Below: Time saved to and from the fill means "cheaper-per-yard" dirt moving. This Allis-Chalmers "L-O" and 10-yard Continental Scraper are shown on the double overhead job of Kramp Construction Co. near Milwaukee, Wis.

MEANS EXTRA PAYLOAD Gained!



How They Did It -

For
Superintendents
and Foremen

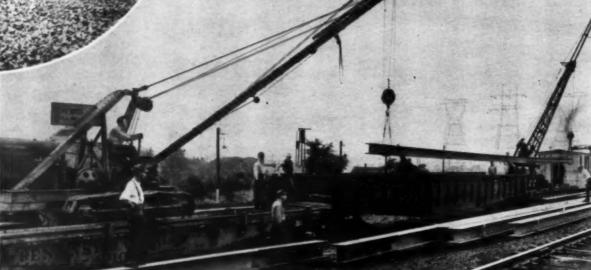
WING EXTENSIONS

(above and left) on blade of Le Tourneau bulldozer enable Heafey-Moore Co., contractor of Oakland, Calif., to spread crushed stone to full width of traffic lane for pavement base on highway tunnel approach in Oakland. Wings are fitted with sleds on ends to ride road shoulders or form rails.



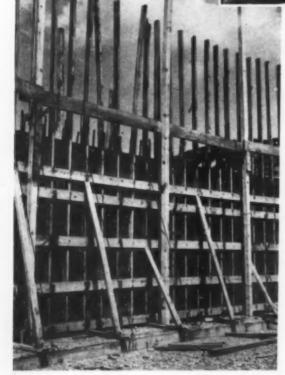
1x6-IN. WALES

(below), with 2x4-in. studs on 12-in. centers, support plywood wall forms of four 160-ft.-diameter sedimentation tanks of new sewage treatment plant being built by Bryant & Detwiler Co., Detroit, Mich., for Buffalo Sewer Authority, Buffalo, N. Y., on Bird Island in Niagara River. Contractor previously employed this forming system on Jackson, Mich., sewage plant.



HANDLING OF STEEL

for towers of Pennsylvania Railroad's electrification project at Hazelton, Pa., is done by two Bay City three-quarter-revolving tractor shovel-cranes equipped with boom extensions and mounted for travel on docks of standard-gage railroad flat cars. Steel rails along each side of flat car deck prevent crawler-mounted cranes from running off during travel back and forth.





TIMBER MATTRESS

measuring 400x250 ft., being fabricated along banks of Mississippi River at Baton Rouge, La., prior to sinking to river bottom to stabilize foundation material at site of one of piers for new \$10,000,000 bridge on which work was inaugurated by Governor Richard W. Leche in ceremony Aug. 7.



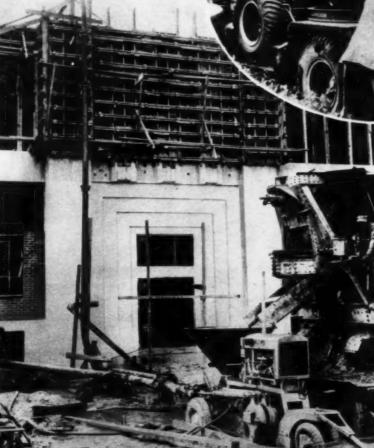
NOVEL WASTE RECEPTACLE

(left) is devised by Maintenance Division of Oregon State Highway Department for use at road intersections, parking areas and schools. Containers are old metal asphalt drums renovated by cleaning and coated with "traffic yellow" paint.



EARTH BORER

(above and left) designed for railroad electrification use, is mounted on rear of Four Wheel Drive truck, able to climb steep grades and travel over rough country by reason of drive on all four wheels. Boring element has demountable tower 18 ft. high and auger shaft 20 ft. long. Augers are 30 and 36 in. in diameter and can bore holes 14 ft. deep. Boring mechanism is mounted on turntable so that operator may dig holes on either side of truck or behind it. Accessories include A. T. & T. winch, niggerhead or capstan and collapsible power reel.



HUGE LOG CRIB

of redwood forms retaining wall 120 ft. long and 30 ft. high protecting California Route 84 along Trinity River in Humboldt County from erosion and permitting center line of highway to remain in original loca-

tion after washout last winter had destroyed portion of route. Logs, costing \$1.25 per lineal foot, were 32 ft. long and had butt diameter of 30 in.— Photo from California Division of Highways.

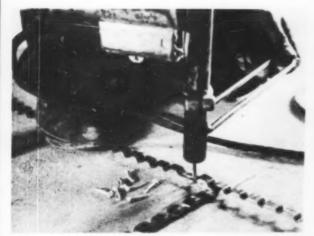


was method employed by John G. Yerington, contractor, to build at Benton Harbor, Mich., cold storage fruit warehouse for House of David colony. Job involved placement of 8,000 cu.yd. of concrete in fourstory structure with 34,000 sq.ft. of storage area on each floor. Using new Rex 160 Pumpcrete, portable concrete pump with capacity of 15 to 20 cu.yd. per hour, Mr. Yerington delivered concrete to place through two pipe lines, one extending up side of building to top for pouring columns, slabs and beams, and other going into base-



SKULL-CRACKER

(left) operated from boom of Lorain truckcrane, helped G. W. Thomas, rigging contractor, of San Francisco, to make quick work of demolishing concrete walls of buildings in area to be occupied by terminal of new San Francisco-Oakland Bay Bridge.





DRILL, operating through runner strip, makes holes in floor for anchoring device.

STURDY, DURABLE partition construction of two types was employed for the intetior walls of the buildings providing 1,622 living units for Williamsburg Houses, in Brooklyn, N. Y., largest of the low-rent mass-housing projects undertaken by the Housing Division of the federal Public Works Administration, under a \$13,459,000 allotment. Measuring only 2 in. thick, the partitions effect a maximum conservation of interior space. Starrett Bros. & Eken, Inc., of New York, were general contractors for the building superstructures.

The method of metal studding construction used by Holdsworth Bros., plastering subcontractors, is illustrated in photos numbered 1, 2 and 3. The runner strip is the Wrigley type in



CHANNEL STUDS are sprung into place between runner strips anchored to floor and ceiling.

VITH HAMM

(left) workman drives home device that anchors runner strip securely to floor or ceiling. The second method of installing the metal studding, employed by the Martin-Conroy Contracting Co., is illustrated in photos Nos. 3, 4 and 5. Here were used a channel on the bottom and an angle runner at the top. Photo 4 shows the channel runner being fastened to the floor with Rawl-Drives, while in Photo 5 the metal lath is being wired to the angle runner at the ceiling. In Photo 6 the channel runner is in place on the floor, studs are sprung in and held with the aid of a Henderson clip and the wire lath is wired to the studs.

Finishing of both types of partition is done with a 1-in. coat of brown plaster on the wire lath then a scratch coat and, lastly, a finishing coat of white plaster on both sides, producing a solid wall 2 in. thick.

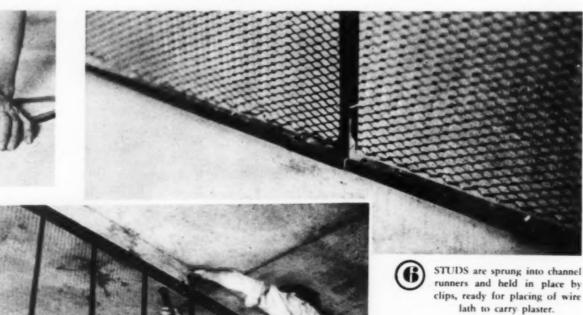
Partition Studding

Securely Anchored



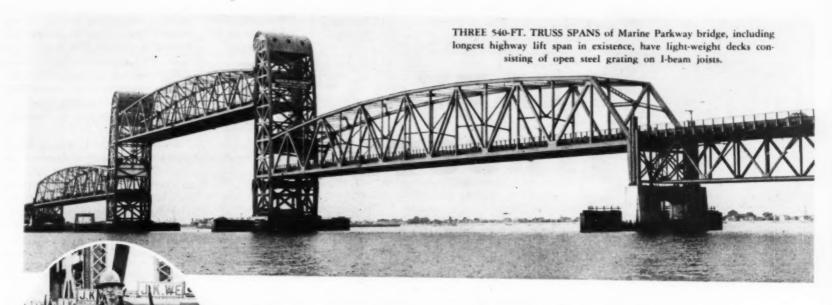
CHANNEL RUNNER STRIP is anchored to floor by pounding in Rawl-Drives with hammer.

which the metal studs are sprung between corrugations. Anchorage of the runner strips is accomplished by Rawl-Drive devices driven home securely into holes drilled in the concrete floors and ceilings. Channel studs are then sprung into place, being gripped by the runner strips on floor and ceiling. The Rawl-Drive, of tempered and hardened steel, combines both bolt and anchor in one piece and is driven, like a nail, into a small drilled hole where the compression of the tempered steel produces adequate holding power.



(3)

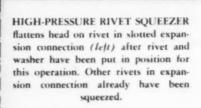
METAL LATH (left) is wired to runner strip at ceiling.



Steel Grating on I-Beam Joists Makes

Light-Weight Bridge Floor

WELDING WORK is directed by A. A. Miller (above), foreman for J. K. Welding Co., Inc., who stands here on completed deck.



LIGHT-WEIGHT FLOOR ING for the 540-ft. lift span A and two flanking through truss spans, each 540 ft. long, of the Marine Parkway Bridge across Rock-away Inlet, New York City, consists of open steel grating laid on 7-in., 17.5-lb., I-section joists spaced 16 in., c. to c., the complete deck weighing only 26 lb. per square foot. Grating units were spliced in the shop of the Irving Iron Works, Long Island City, into panels 4 ft. wide and 38 ft. 6 in. long. Slotted expansion connections between the long panels were made at the intermediate floor beams in the field by the erection crew, as shown in accompanying photographs. The erection crew laid the grating for the 540 x44-ft. roadway of the north flanking span in 5 days.

A total of 70,000 fillet welds fastens the grating to the steel joists on the three spans. These welds, comprising 3/8-in. fillets 21/2 in. long, made up the bulk of a subcontract executed by the J. K. Welding Co., Inc., Long Island City, for the American Bridge Co., superstructure contractor. The welding contract included also 1,800 lin.ft. of butt welds in the seams of the top machinery housing and the control rooms in the towers of the lift span. An accompanying photograph indicates the curved steelplate surfaces of the machinery housing at the tower tops. The welding contractor used eleven 300- and 400amp. single-operator machines (Hobarts and Lincolns) on the three spans and melted about 8,000 lb. of 5/32to 1/4-in. coated electrode in completing the job, which included a large amount of miscellaneous welding. In welding the grating of one side span to the steel joists, the operators completed 22,000 welds in 31/2 days.

Foundations of the Marine Parkway Bridge were constructed by the Frederick Snare Corp., New York City, and the superstructure was erected by the American Bridge Co. for the Marine Parkway Authority, of which Robert Moses is commissioner and Madigan-Hyland are consulting engineers. Waddell & Hardesty, New York City, designed the towers, lift span and flanking truss spans, which were erected on floating falsework as shown in Construction Methods and Equipment, May, 1937, pp. 56-57.



NINE WELDING MACHINES supply current to as many operators working on steel grating of south span.

HEAVY CONSTRUCTION

Principles and Practices of Job Layout and Selection and Use of Equipment

By ADOLPH J. ACKERMAN and CHARLES H. LOCHER

Water Requirements for Large Project

Construction Engineer

Construction Consultant

. 22 .

Water Supply, **Concrete Mixing and Transfer Equipment**

ATER requirements for a large project may be divided into three classifications: Ordinary raw water; special raw water; and fresh water. The listing shown opposite is representative, as employed at Norris dam.

A load factor of more than 661/3 per cent is not advisable due to occasional peak demands. On this basis with the pumps operating 40 min. per hour, the demand of 118,000 g.p.h. as listed in the accompanying table is met by the installed plant.

Special Raw Water

Certain features require the use of large quantities of raw water for short periods. Due to the large volume required, it is generally not feasible to supply it from the plant water system. The accompanying item is an example of special raw water requirements:

In cold climates standard precautions against freezing must, of course, be observed. This usually includes heating the mixing water by injecting steam, to provide against the freezing of concrete while it is curing.

Concrete Mixing Plant

It is almost standard practice now to construct mixing plants for large construction jobs of structural steel. Such plants are designed for vertical flow of aggregates from storage bins at the top through aggregate batchers, and from there to the mixers. The modern specifications for concrete on large jobs generally require four separate sizes of coarse aggregate, one or sometimes two sizes of sand, besides cement, thus making 6 or 7 different materials which must be stored in the bin compartments. For rapid batching this led to the use of individual batchers so that the different materials

Total Gal. ORDINARY RAW WATER 1. Foundation Cleaning
Six ¾-in. water siphons @ 1,000 g.p.h. 6,000
2. Core Drilling
Four 5½-in. Calyx drills @ 3,500 g.p.h. 14,000 Three 2,440 c.f.m. units @ 2,320 g.p.h.

5. Sand Plant, 100 tons per hour
One 15-ft. & one 13 ft. 3 in. rotary sand washers @ 21,000 g.p.h. 42,000
6. Concrete Plant: Three 3-yd. mixers
In concrete @ 1,670 g.p.h. per mixer 5,000
Washing waste pit: 1-in. hose @ 10,200 g.p.h. 10,200
Wa.hing concrete cars and buckets 100
7. Concrete Curing and Form Washing
Eight 34-in. water lines @ 2,500 g.p.h. 20,000
8. All Miscellaneous Uses 1,000
TOTAL 118,000

Two 8-in. centrifugal pumps in tandem rated at 2,350 g.p.m. at 400 fone 4-in. centrifugal pump: 600 g.p.m. @ 400 ft. head One 4-in. centrifugal pump: 600 g.p.m. @ 400 ft. head	36,000 .Used as spare
RAW WATER REQUIREMENTS	Total Gal. Per Hour
1. Sluicing Quarry Overburden Two 4-in. sluice guns @ 52,500 g.p.h. The pump installation for this purpose consisted of the following: Two 8-in. centrifugal pumps in tandem rated at 1750 g.p.m. @ 600 ft. head One 8-in. centrifugal pump as a booster rated at 1750 g.p.m. @ 200 ft. head	

FRESH WATER REQUIREMENTS

n garage, carpenter snop, n, sanitary uses, tourist	
and latrines, offices, etc	3,750

could be batched almost simultaneously, with the further innovation (for plants with 3 or 4 mixers) of a collecting hopper below the batchers feeding a revolving discharge chute to direct the aggregates to each mixer in sequence. The mixers are set radially and discharge into a common central opening to the concrete transporting means below. This type of plant was devised by C. S. Johnson and the first one was installed at Madden dam from designs made by the contractor's engineers. Since that time it has been used on other important projects, including Norris, Pickwick, Chickamauga, Fort Peck, Tygart, and Grand Coulee dams.

An important feature at the base of a mixing plant is the "wash-out pit" into which the wash water used

to clean the mixers, as well as condemned batches, may be dumped and flushed away through a large culvert drain. The foundation layout should also provide for an independent base for the mixers in order to cut down vibrations in the building which may destroy the accuracy of the weighing equipment.

Before a mixing plant can be designed it is necessary to determine the required size and number of mixers in other words, the expected output of the plant, both actual and theoretical. This must be based, in part, on factors outside of the plant which have a major bearing on the overall economics of the construction program, such as:

- 1. Economic rate of supplying aggregates.
- 2. Best adapted concrete placing plant.
- 3. Limitations in speed of construction due to nature of the structure.
- 4. Completion date required by the contract.

These points will be discussed in further detail in the next chapter.

The size of the mixers generally depends on the capacity of the concrete placing buckets and transporting system in the placing plant, as follows:

SIZES OF BUCKETS AND MIXERS

Capacity of Buckets	
Cu.Yd.	Cu.Yd.
1	1 or 2
2	1 or 2
3	2 or 3
4	2 or 4
6	2 or 3
8	2 or 4

Where the size of the mixer has an odd mathematical relationship to the size of placing buckets, an intermediate surge hopper is necessary from which the buckets are filled. All mixers should be of the same size in a plant. On a large job the installation of a spare mixer may be justified, especially where the plant is laid out readily to accommodate an extra unit.

Having defined the required monthly output (actual) of a concrete plant, the average daily output is readily obtained. This average output usually runs about 60 to 70 per cent of the



STRUCTURAL STEEL MIXING PLANT as used at Madden, Norris, and Chickamauga dams. Cement is delivered to storage silo by trucks from railroad terminal.

Mixer Plant Output											
Project	No. of Mixers	Capacity of Mixers	Cycle Time Per Mixer.	Theoretical Output	Best Actual Daily Output in Cu.Yd.						
Project	in Plant	Cu. Yd.	in Min. and Sec.	Cu.Yd. per Hr.	Per Hr.	24 Hr.	Per Month				
Madden	3	2	3- 0	120	141	2,897	60,516				
Norris	3	3	2-51	180	181	4,090	92,780				
Tygart	4	3	2-45	240	274	5,679	125,445				
Chickamauga	2	2	2-23	100	102.5	2,364	45,798				
Wheeler	1	2	2- 81/2	50	54	1,000	25,600				
Pickwick	3	2	2-15	150	140	2,800	53,400				
Guntersville	2	2	2-18	100	104	2,081	39,706				
Grand Coulee	4	4	3	320	382	9,170	221,615				

theoretical output for which the mixing plant should be designed. The theoretical output represents plant ability and must coincide with computed output based on individual cycles. For example, a 2-yd mixer with a 3-min. cycle (2 min. mixing and 1 min. charging and dumping) will theoretically produce 20 batches or 40 cu.yd. per hour, or 880 cu.yd. in 22 hr. This output may actually be attained on occasional days when everything is going perfectly, but the average for a month of 25 days will more likely be 575 cu.yd. per day.

The table shown above gives representative plant installations and outputs from actual experience:

Batchers

One of the most important considerations in laying out a batching system is to provide easy means for changing the mix and for making whatever adjustments may be required by the concrete inspector. Such changes should be made without introducing delay in the normal functioning of the plant. Convenience in making such adjustments prevents misunderstanding and carelessness. When changing from one class of concrete to another, adjustments must usually be made on the water, cement and all aggregate batchers, and in compensating for moisture

Capacity Cu.Yd.

Size

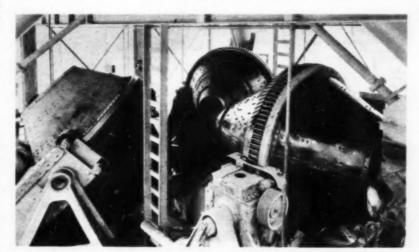
56-S

112-S

in the sand. Proper control of the discharge of the various batchers has an important bearing in getting effective mixing action and quick delivery to the mixers.

In the selection of batchers the multiple type is quite satisfactory for small plants where the amount of concrete to be mixed is not very great and the hourly output is relatively low—around 50 or 60 cu.yd. per hour. For mixing

plants with three or four mixers the individual batchers are indispensable because of adjustments that can be made in the various quantities being weighed out and in changing from one class of concrete to another, of which there are generally four and sometimes five kinds. Individual batchers can quite successfully be operated by direct lever control and this is preferred because of its greater simplicity for plants



THREE 3-yd. tilting mixers at Norris Dam set radially for discharging into central hopper spout. Tilting is done by air pressure from central control stand.

30

40

TILTING

Weight,

25.000

45,000

Standard Large-Size Concrete Mixers

Weight,

22,000

27,000

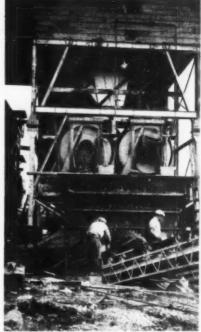
NON-TILTING

Motor





FLOATING MIXING PLANTS used at Wheeler Dam showing aggregates in four sizes delivered in barges and special cement barge at rear from which cement is pumped by unloaders into silo located on floating plant.



NON-TILTING MIXERS arranged for discharging concrete into collecting hopper which feeds belt conveyor.

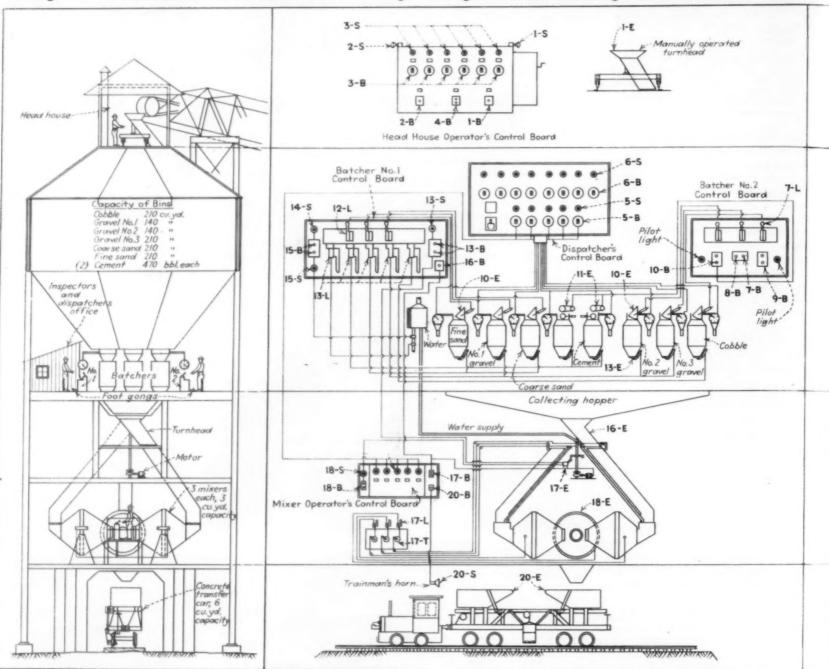
producing around 75 to 125 cu.yd. per hour. At Norris dam the plant was designed for a capacity of 180 yd. per hour, and here manual air valves were used in the manipulation of all filling gates and discharge gates, the control being centered at two stands from which two operators could view the various scales and visually control the filling. A system of illuminated markers set on the rim of the dial scales directed the operator to fill the batchers until the scale pointer coincided with

BATTERY of individual batchers and dial scales for weighing aggregates at Norris Dam. Filling and discharge gates are controlled by two operators from central control table, one of which is here shown. Note special type of feed gate on cobble batcher in foreground.

the marker. This system was very successful and simple in its layout and method of operation.

There has been considerable tendency to overdesign mixing plants to make them fully automatic. It should be recognized that such plants have advantages in special cases, as, for example, the feeding of aggregate to

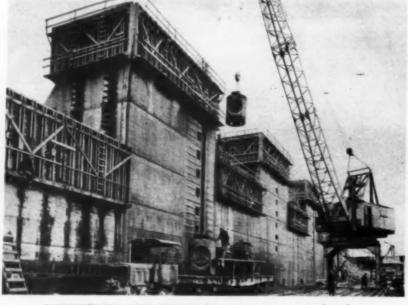
Diagram of Functions and Instructions for Operating Concrete Mixing Plant at Norris Dam



four mixers in succession. This places a high demand on the rate of batching aggregates which extends beyond the point of normal human operation and in such cases the automatic system is fully justified because of the necessity of obtaining maximum production. At Grand Coulee dam, for example, the fully automatic plants have been quite successful,

For some of the smaller plants the argument has been offered that an automatic plant reduces the number of operators, but this is frequently not the case because in place of a second operator, it is usually necessary to keep an electrician around to prevent shutdowns in the concrete plant and in all of the placing system due to faulty connection or other electrical trouble.

Automatic equipment is generally satisfactory where it must function to replace limitations of human control. There is great danger on construction



CONCRETE TRANSFER TRAIN delivering concrete in buckets from stationary loading hopper to rehandling crane at Chickamauga Dam.

jobs of trying to make things too automatic when it is really necessary to have a certain number of men around at different stations in any case, and it would normally be better to keep the men busy with manual operations, especially when this leads to simplification and greater reliability of operation. Automatic equipment should preferably be of a type which will be indicative rather than directly controlling, so that the main operations may continue under emergency methods in the event of failure of the automatic system.

Concrete Mixers

Concrete mixers are obtainable in standard sizes of $\frac{1}{3}$ -, $\frac{1}{2}$ -, $\frac{3}{4}$ -, 1-, 2-, 3-, and 4-cu.yd. capacities. There are two standard types of stationary concrete mixers, the tilting and non-tilting types. The tilting type is found more commonly on large construction jobs because it has the advantage that aggre-

Object of Signals and Functions of Levers	Personnel	Operating Instructions
1-E. Manually operated turnhead hopper. 1-B. Button signal to cement silo to start cement pumpa. 1-S. Horn acknowledging signal. 2-B. Signal button to operate aggregate feed gates. 1 blast to start; 2 blasts to stop. 2-S. Horn acknowledging signal buttons. 3-B. Aggregate selecting signal buttons. 3-S. Aggregate selecting indicating light. Light on aggregate being sent. 4-B. Button to start conveyors (interlocked).	1 HEAD-HOUSE OPERATOR	A. Operate and maintain head-house equipment. B. After sounding one blast on 2-B to tunnel operator and receiving one blast from him on 2-S, start conveyor with 4-B, revolve turnhead hopper to desired bin, then press 3-B indicating to tunnel operator the type of aggregate desired. C. After bin is full, give 2 blasts with 2-B, receive 2 blasts on case and repeat B. D. Determine contents of cement bins with sounding weight. When low, give 1 blast with 1-B to silo, receive 1 blast on 1-S from silo acknowledging signal. E. After bins are full give 2 blasts with 1-B to silo, receive 2 blasts on S-1 from silo acknowledging signal; cement stops.
5-B. Toggle switch to set scales indicating desired mix. 5-S. Signal light indicating type of mix in operation. 6-B. Toggle switch to cut out any batcher desired. 6-S. Light indicating batcher which has been cut out.	1 DISPATCHER	A. Receive all instruction from dam by telephone. B. Set all batcher scales indicating type of mix desired by button 5-B. C. Adjust water batcher. D. Control movements of trains and cableways.
7-L. Air levers for filling batchers. 7-B. Switch for establishing automatic filling of cement hatchers. 8-B. Switch for changing from automatic to manual cement filling control. 9-B. Start-button for automatic control (with emergency stop). 10-B. Start-and-stop button for manual control. 10-B. Air-operated gate for filling batchers. 11-B. Motor-operated gates for filling cement batchers.	BATCHER OPERATOR No. 2	A. Upon hearing foot gong from batch operator No. 1, fill gravel batcher No. 2 and No. 3, cement and cobble batchers. B. If change of mix has been indicated, shift automatic cement control to manual cement control and fill cement batcher. C. Sound gong to batch operator No. 1 that batchers are full. D. Upon signal from batch operator No. 1 repeat operation.
 12-L. Air levers for filling batchers. 13-L. Air levers for dumping all aggregate, cement and water. 13-S. Light from mixer man to dump batchers. Light on-dump batchers. 13-B. Switch to signal mixer man that batchers are empty. 13-E. Air-operated gates for dumping batchers. 14-S. Blue light indicating water tank is being filled. 15-S. Red light indicating water tank is being discharged. 15-B. Automatic water batcher control. 16-B. Start button for motor-driven turnhead. 	BATCHER OPERATOR No. 1	 A. Sound gong for batch operator No. 2 to fill batchers. B. Fill batchers — fine sand, gravel No. 1 and gravel No. 2. C. Upon receiving signal on 13-8 from mixer man and after blue light 14-8 is off, dump all batchers by air levers 13-L. D. After all batchers are empty signal mixer man by turning off light 18-8 at 13-B, start turnhead 16-E with button 16-B, sound gong for batch operator No. 2 to fill batchers and cycle is repeated.
16-E. Motor-driven turnhead. 17-B. Start-and-stop button for motor-driven turnhead. (Not used when 16-B is operated). 17-E. Position limit switch automatically to stop turnhead and close signal circuit \$3-13. 17-L. Air levers for dumping mixers mechanically interlocked with timers. 18-T. Mix timer actuated by turnhead 16-E, timer starts when turnhead leaves position after charging mixer. 18-E. Mixer, air dumped. 18-B. Signal to batch operator No. 1 to dump batchers (3-way switch). (on, dump batchers.) (off, batchers are empty (return signal from batch operator). 19-S. Mix-type indicator lights. 20-B. Button horn for trainman [1] blast, move up. 12 blasts, proceed.	1 MIXERMAN	A. Check position of turnhead 16-E and if necessary adjust by means of 17-B. B. Signal batch operator with 18-B to dump batchers. C. After 18-S is off (indicating batchers are empty), repeat A and B. D. Upon release from mix timer and after seeing car in position, dump mixer. E. Give 1 blast on 20-S for train to move up. Give 2 blasts on 20-S for train to proceed.
20-E. Concrete transfer car. 20-S. Dispatching signal. 1 blast, to move up. 2 blasts, to proceed.	TRAINMAN	A. After spotting train and receiving first batch, move forward upon 1 blast from horn 20-S, wait for second blast, then proceed with train.
	1 MECHANIC 1 CONCRETE INSPECTOR 1 FOREMAN	A. Maintain and lubricate all equipment. A. Control all concrete proportions and consistencies and do all testing. A. Supervise, instruct operators and act as relief operator.

gates of 6 to 8 in. and larger can be used without difficulty, whereas with the non-tilting type such aggregates would foul the discharge chute and damage it. For aggregates of small sizes, especially from 3 in. and lower, non-tilting mixers are highly satisfactory and have the advantage of simpler charging and discharging spouts. In an effort to simplify the charging spouts on tilting mixers, with a consequent reduction in the height of the mixing-plant structure, there has recently been developed a front charging and discharging mixer which was used successfully on the Tygart and Grand Coulee dams. The proper design of the blades proved to be a major problem in perfecting this new type.

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In the tilting mixer the mixing action is largely one of rolling the material from end to center and on itself whereas in a non-tilting mixer the material is not only rolled but also lifted in the buckets and then dropped. In some cases this is a serious consideration where there is a tendency for the large aggregate to spall and develop an excess amount of fines which tend to dry up the mix. The design of the blading requires careful considera-

tion to reduce the tendency of concrete accumulating between the blades and packing up, particularly when making relatively dry concrete.

A rapid discharge is of great importance in mixers because the mixer time



CONCRETE TRANSFER TRAIN with cars of special design for transferring concrete to cableway bucket at Norris Dam.

cycle, as a rule, defines the time cycle and output for the rest of the operations. The mixing time for large mixers is now generally accepted as follows: 2-yd. capacity and less, 2 min.; 3-yd. capacity, 2 to 2½ min.; 4-yd. capacity, 2½ to 3 min. In some cases it has been found feasible to shorten the mixing time somewhat, especially where the mixing action is effective in rapidly producing a uniform batch as determined by careful analysis of samples taken from various points within the mixer. The accompanying data apply to standard mixers.

Tilting mixers are, as a rule, equipped with removable liners which can be replaced. It has been found that if these liners are surfaced with a special hard welding rod their life can be very materially extended and it is usually worth while to apply such a welded coating to the interior of mixers, as the maintenance costs are thereafter substantially reduced. Such welding should be applied with proper consideration of the mixing action so that at points of extreme wear the hard surface may be made especially thick. At Norris dam the hard welded surface was applied directly on the interior of the drum. Each mixer produced about 300,000 cu.yd. of concrete with only slight retouching of the lining. The blades were built up about every 40,000 cu.yd.

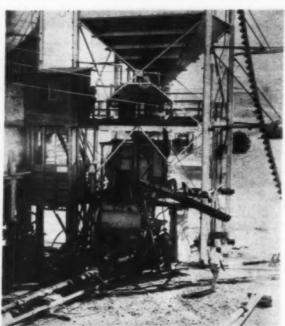
By installing a wattmeter in the circuit of the mixer motor it has been found feasible to get some approximation of the consistency of the concrete in the mixer. A very dry mix takes more power than a soft mix, and the information thus gained helps to control the quality of the concrete before it leaves the mixer.

Transfer of Concrete

The selection of suitable transfer equipment depends primarily on the adopted type of concrete placing plant and on the loading facilities at the mixer end. This interrelation deserves considerable study, as is further described in the next chapter. It is also important to preserve the quality of the concrete by avoiding segregation and preventing delays during the time between discharging the concrete from the mixers and placing it in the forms. This is particularly important in hot weather where "flash setting" may occur rather suddenly, and such a premature and partial consolidation renders the concrete unfit for final placement.

Where the concrete is discharged by the mixers directly into buckets it may be transferred either on trains or, where the distances are relatively short, on trucks. Handling of concrete in buckets is considered one of the most satisfactory methods because segregation is reduced to a minimum and it is possible to handle a drier mix, which means that the concrete may be designed with a substantial economy in





CONCRETE PUMP being charged by overhead mixer at Imperial Dam.

the use of cement because of the reduction in water content. Most of the standard buckets on the market have conical bottoms and constructed discharge gates, which are satisfactory for concrete with a slump of 3 in, but invariably fail to release dry concrete with a slump of 1 or 2 in., as is sometimes used in massive structures. Special buckets with straight sides and full bottom discharge have been designed which can handle such dry concrete. The use of compressed air rams to operate the discharge gates, as introduced at Norris dam by Ross White, has helped to simplify the handling of dry concrete in large buckets.

At Norris dam the concrete was placed by cableways. Because of the difficulty and loss of time in releasing empties and picking up loaded buckets, a bucket was left attached to each cableway hook and the concrete was transferred from the mixing plant in special cars with tilting skips which were designed to raise and dump the concrete into the buckets. For this purpose the transfer cars were connected to locomotives of the gasolineelectric type so that the electric generators could be used not only for propelling the equipment but also for operating the tilting skips.

Another satisfactory transfer means



BUGGIES for distributing concrete over wide areas.

is the belt conveyor, even for dry concrete, provided it is fed to the conveyor in a continuous ribbon to prevent segregation, and provided, also, that the discharge end is designed to prevent segregation due to centrifugal force. The usual tendency is for the larger aggregates to fly off and the fine aggregates and cement mortar to adhere and develop segregation; suitable wipers to prevent return travel of the cement paste, together with baffles and very narrow, deep hoppers designed to re-mix any segregated materials, are essential features of belt conveyor lay-

outs. With a long belt conveyor layout there are usually several yards of concrete on the belt and it is more difficult to handle four or five different kinds of mixes, some of which are sometimes required to come in sequence, and in such cases the handling in buckets deserves further study. Furthermore, in the case of hold-ups or shut-downs, there is a considerable quantity of concrete retained on the belt which may lose its quality if held too long.

For secondary distribution, buggies, chutes, and tremies are standard items of placing equipment.

Concrete Pump

A more recent development in transfer equipment, which at the same time is also a placing unit, is the concrete pump, which has had a rather satisfactory acceptance in a specific field. It is quite important that its field of usefulness be properly recognized because there are some places where the nature of the aggregate or the nature of job is such as to make it unsuitable, and nothing is gained in trying to use the pump in such places.

The "Pumpcrete" unit, as it is

known in this country, is designed to handle plastic concrete through a pipe line by a direct-acting pump. The unit consists of an overhead hopper with an agitator blade, a set of valves through which the pump cylinders are filled, similar valves on the discharge side of the cylinder which open when the cylinder is full, and a direct-acting plunger which pushes the concrete forward into the pipe line. The valves are operated by eccentric rods driven by the plunger shaft. It takes about 50 to 60-hp, motors to operate such units, which are capable of moving concrete a distance of 1,000 ft. at a rate of 50 to 60 cu.yd. per hour. The pump is designed so that all wearing parts can be readily replaced. With certain kinds of aggregates or harsh sand, this may be a considerable item of expense.

Harsh concrete is not readily pumped; The best slump is about 3 in., which is a concrete of very satisfactory quality. The largest size aggregate which can be pumped by this equipment is about 3 in. This does not mean a large amount passing a 3-in. screen size, where there may be elongations of greater dimensions, but preferably occasional stones of this maximum size mixed into a uniform composition. For this size 8-in. pipe is used and the largest size of pump available.

The pipe used with this equipment is of special design in 10-ft. lengths and either 6, 7, or 8 in. in diameter with special toggle connections for quick assembling or dismantling. There are also special bends, 90, 45, and 221/2 deg., together with adapter sections. A line is usually good for about 50,000 cu.yd. As a general rule, it is more difficult to pump vertically than horizontally, and the equivalent of 1 ft. vertical is about 8 ft. horizontal.

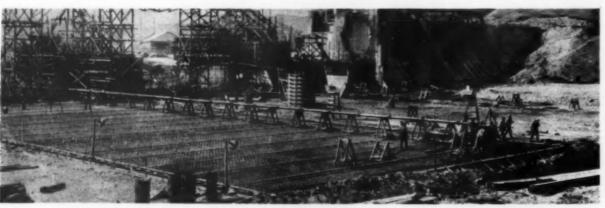
DIMPED CONCRETE DATA

	OMED	CONCRE	IE DAIA
Pipe	Horiz.	Vert.	Max.
Size,	Pumping	Pumping	Size of
In.	Dist. Ft.	Dist. Ft.	Aggregate, In.
8	1000	100	3
.7	800	100	21/2
	600	100	934

After the equipment has been in service and pumping is to be discontinued, the pipe is cleaned out by means of a special element known as a "godevil," which is shoved through the pipe behind water pressure, and the water at the same time washes out the

This type of equipment is particularly useful as a supplemental unit for a main placing plant in order to reach inaccessible places, or on certain large jobs where the work is spread over great areas and is of a rather complicated nature, such as the Imperial Dam at Arizona. In that case the entire project, with 120,000 cu.yd. of concrete, is being placed by means of pumping equipment.

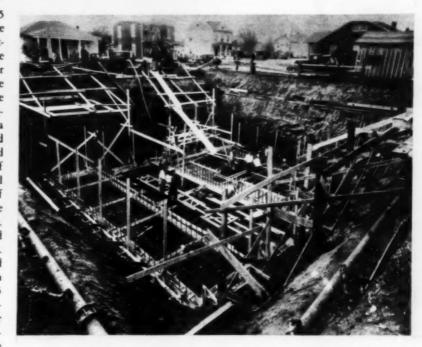
NEXT MONTH-Chapter 23 of the series on "Heavy Construction," by A. J. Ackerman and C. H. Locher, to appear in the November issue, will discuss crete Placing and Forms."



DISCHARGE END of concrete pumping line showing distribution of concrete over spillway apron area at Imperial Dam.

Well Points Drain Sewage Plant Foundation

FTER EXCAVATING about 5 ft. below the surface of the ground to water level in Eastport, Md., at the site of a sewage pumping station under construction for the Annapolis Metropolitan Sewerage Commission of Annapolis, Md., the Marocco Construction Co., of Baltimore, general contractor, installed a system of well points in the firm red clay soil (containing some sand) and lowered the water level in advance of excavation with back hoe and clamshell to El. -20, which is the elevation of the bottom of the foundation mat. The mat measures about 40x40 ft. in plan. Header pipe 6 in. in diameter was laid at the original water level about 15 ft. back from the edge of the mat around the four sides of the excavation, with the exception of a gap of about 35 ft. which was omitted from the rectangle along the street side. The header pipe was tapped for well-point connections at 5-ft. intervals, but some of these connections were not used, the average well point spacing being probably 7 ft, instead of 5 ft.



EXCAVATION IN THE DRY for 40x40-ft. mat foundation for sewage pumping station at Annapolis, Md., was made possible by well points tapped to 6-in. header pipe extending around four sides of pit.

A gasoline-driven double-diaphragm pump pulled the water out of the well-point system. A second similar pump was kept in reserve for emergencies. After excavation had been completed to foundation level, the contractor dug a sump along the street side of the hole and operated a diaphragm pump to lift water from this depression, the use of the well points being discontinued. The contractor's forces worked on a practically dry bottom throughout the excavating period of about three weeks and during the concreting of the foundation mat. Domestic Engine & Pump Co. pumps and points were used for the drainage.

Robert L. Burwell is chief engineer of the Annapolis Metropolitan Sewerage Commission, which was created by legislative act of the General Assembly of Maryland to construct works for collecting and disposing of sewage from Annapolis and nearby communities. For the Marocco Construction Co., Pio Marocco was in charge of the work, while M. H. Ruark acted as contractor's engineer.

Sponge Rubber Expansion Joints

ing extrusion of filler material from expansion joints when structural concrete expands, the engineers of the Missouri State Highway Department specified pre-molded sponge-rubber filler for practically all exposed joints in the many structures on the new Express Highway, St. Louis, described in Construction Methods, January, 1936, pages 68-71. The

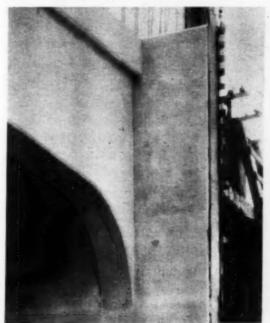
material is installed between the various sections of wing walls and retaining walls and between concrete hand rails on bridges and other structures subject to temperature changes.

Thicknesses of the sponge rubber, made especially for this service by the B. F. Goodrich Co., Akron, Ohio, vary from 3/4 to 1 in. Each joint is designed to allow for 50 per cent compression in the rubber as the concrete sections ex-

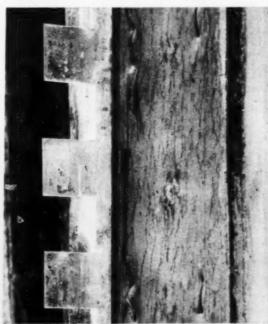
pand. In addition to its non-extruding feature, the sponge rubber is furnished in a color which matches that of the finished concrete, making the joint both smooth and inconspicuous.

In the expansion joints between abutment walls and wing walls, as well as between sections of wing walls and retaining walls, the Highway Department is using a keyed expansion joint with sponge rubber cut to fit the key. Copper flashing is placed across the joint to protect it from moisture, as indicated by accompanying photographs.

C. W. Brown is chief engineer of the Missouri State Highway Department, and J. J. Corbett is engineer of construction. The Express Highway was built under the direction of P. H. Daniells, division engineer, Kirkwood, Mo.



VERTICAL JOINT on wing-wall of concrete bridge is prepared with premolded sponge rubber and copper flashing.



DETAIL of copper flashing and sponge rubber strip 1 in. wide, designed for 50 per cent compression.



COLOR of sponge rubber joint filler is chosen to match concrete surface and be inconspicuous.

Who's Who

on \$3,500,000 water supply project for Little Rock, Ark., (described in this and last month's issues) comprising rolled earthfill dam and 32-mi. pipe line, and completed under direction of Burns & McDonnell Engineering Co., Kansas City, Mo., who are represented on project by (below, left to right, front row) ROBERT MACKENZIE; HARRY HOAK; HARRY WALSER; MARION L. CRIST, resident engineer in charge of operations; EDWIN ELLIOTT; EARL THOMSON; C. A. MACKENZIE; (rear row) ROBERT BURNS; NICK ROWLAND; RICHARD OVERMAN, Jr.; ELWIN CHERRY; HARRY HAWKINS; GEORGE WHERRY; BEN COX.



STEEL-CORE CONCRETE PIPE

for 32.4-mi, water supply line at Little Rock, Ark., is manufactured by Lock Joint Pipe Co., Ampere, N. J., contractor, at Little Rock plant managed by (left to right) G. B. PARSONS, plant superintendent; McIVER ROUNTREE, engineer; E. J. EDDY, bookkeeper; JOHN A. COX, office clerk; JOSEPH E. WOODS, timekeeper.

TWO TUNNELS

on Little Rock, Ark., water supply line are driven by Salmon & Cowin, Inc., Birmingham, Ala., under direction of GEORGE M. BROWN (below), superintendent.



CONCRETE SPILLWAY

and miscellaneous structures requiring, in all, more than 11,000 cu.yd. of concrete are built as part of rolled earthfill water supply dam for Little Rock, Ark., by WILLIAM PETERSON (right), of Little Rock, subcontractor, and L. A. OHLESON, superintendent, acting under subcontract with L. O. Brayton & Co., general contractor.



SUPERVISORY INTEREST

of PWA at concrete spillway of Little Rock, Ark., water supply dam is represented by G. T. FOSTER, resident engineer-inspector, who stands here at left of WILLIAM PETER-SON, subcontractor for concrete work under L. O. Brayton & Co., general contractor.



PIPE-LINE CONSTRUCTION

on 32-mi. water supply main for Little Rock, Ark., goes forward under direction of (left to right): L. G. WILHELM, general superintendent, Lock Joint Pipe Co., Ampere, N. J., general contractor; S. E. EVANS, pipe-laying subcontractor, Fort Smith, Ark.; and JIM STEBBINS, foreman of one of Mr. Evans' two trenching and pipe-laying crews.

ROLLED EARTHFILL DAM

to impound water for Little Rock, Ark., is constructed under \$922,000 contract by L. O. Brayton & Co., Dyersburg, Tenn., with A. G. HALL (left) in charge of work. Under truck trailer with Mr. Hall is MARION L. CRIST, resident engineer, Burns & McDonnell Engineering Co., Kansas City, Mo., designing and supervising engineers.



Present and Accounted For-





SUPERINTEN-DENT

on 170x1,000-ft., all-welded steel frame plant building for Union Metal Products Co., at Hammond, Ind., is BERT C. KNAPP. in charge of construction for The Austin Co., contractor, of Cleveland, Ohio,



STATE HIGHWAY **ENGINEER**

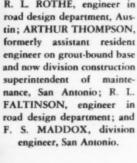
of New Jersey, recently appointed to succeed Major William G. Sloan, is JAMES LOGAN. For a period prior to his promotion Mr. Logan had been serving as acting state highway engineer.



ON INSPECTION TRIP

over asphalt surfaced grout-bound broken-stone base construction south of San Antonio, (described elsewhere in this issue) Texas State Highway Department men line up in front of century plant. (Left to right)

R. L. ROTHE, engineer in road design department, Austin; ARTHUR THOMPSON, formerly assistant resident engineer on grout-bound base and now division construction superintendent of maintenance, San Antonio; R. L. FALTINSON, engineer in road design department; and F. S. MADDOX, division





are now built and maintained under the supervision of JULIAN MONTGOMERY (left), newly appointed state highway engineer succeeding Gibb Gilchrist, re-signed to become engineering dean of Texas A. & M. College. Mr. Montgomery was formerly state engineer and state director for the federal Public Works Administration in Texas.

Construction Equipment News

(All rights reserved)

Review of Construction Machinery and Materials for October, 1937

HYDRAULIC SHOVEL LOADER (right). digs and loads earth, clay or gravel; charges concrete mixers; excavates for basements; handles cut-and-fill work; loads and transports snow coal and other bulk materials; backfills and spreads. Unit consisting of Hough loader mounted on Allis-Chalmers tractor, has following features. or mounted on Anis-Chaimers tractor, has following features. (1) Positive displacement multi-van type pump direct connected to tractor engine crankshaft and operating under 1,000-lb. working pressure; (2) three-way-type control valve operated from driver's seat; (3) valve operated from driver's sect; (3) cylinder of seamless steel tubing 5½ in. inside diameter and with ¼-in. wall; (4) cast steel sheaves and 7/16-in. cables; (5) ½-cu.yd. bucket of 5/16-in. steel plate with high carbon cutting edge. Bucket rises about 9 ft. in 10 sec. or less and has maximum dumping clearance of 7 ft. 3 in. Overall height of machine with bucket fully raised, 11 ft. 6 in. Tractor powered by 36-hp., 4-cylinder, heavy-duty, valve-in-head gasoline engine with 4½-in. bore, and 5-in. stroke and operates at governed speed of 1,200 r.p.m. Loads trucks at

rate of 30 to 40 yd. per hour. From stock-piles at 40 to 50 yd. per hour. Extra equipment, backfiller blade and snow bucket. — Frank G. Hough Co., 919 N. Michigan Ave., Chicago, Ill.

SEMI-TRAILER DUMP TRUCK (below), 14-cu.yd. capacity, consists of 6-cylinder power unit coupled to Mack semi-trailer. All-aluminum body. Steel plate over floor. Outside mounted telescopic hoist. Unit hauls 21 to 24 tons of sand and stone from quarries to plant of its owner, George M. Brewster Co. of Bogota, N. J. Top speed of 32 m.p.h. enables truck to transport loads in fast time and to supply large amounts of building materials for ready use.—Mack Trucks. Inc., 34th St. 6 48th Ave., Long Island City, N. Y.



TRUCK CRANE MOBILITY (below), coupled with quality and ruggedness, are built into new truck crane available in 1/4, 1/2, and 1/4, cu.yd. capacities. May be equipped as crane, dragline or shovel. Unique features: rotating bed plate is casting with side frames cast integral, assuring permanent alignment of shafting. Power takeoff is helical gear drive mounted on ball and roller bearings and runs in oil-tight housing. Ball and roller bearings used on all high speed shafting. Cushion clutch, "feather-touch" control, ventilated uniform pressure swing clutches, adjustable hook rollers and worm boom hoist which eliminates all boom chattering are standard equipment.— Northwest Engineering Co., 28 E. Jackson Boulevard, Chicago, III.



RUBBER EXPANSION JOINT FILLER for joint openings is used in concrete highways, structures, curbs, sidewalks, tanks and other types of construction. Preformed strips are of specially compounded wear-resisting rubber, designed with flexible lips on two sides (in inset) which project upward against concrete surface of joint opening making removal difficult. For easy compression strips are made with tubular opening in center. Top surface slightly, indented and grooved to provide for downward thrust of surface when compressed and to prevent material from extruding above wearing surface of pavement. Made about 25 per cent wider than opening to allow for expansion and contraction of concrete. Advantages claimed: eliminates expensive joint work; low in cost; entails no waste; undamaged by ordinary handling; quick installation without special tools.—B. F. Goodrich Co., Mechanical Rubber Goods Div., Akren. Ohio.



October, 1937 - CONSTRUCTION Methods and Equipment



ANGLE BLADE (below), for Trackson pipe-layer, mounted on Caterpillar tractor, is especially useful for reconditioning and repair work, as well as on short line construction, building gathering lines and laying short loops or laterals. Anglefilling trench insures uniform compact fill by tamping action of tractor tread, and the properties of the compact form and possibility of damage from undersuits and form compact fill by tamping action of tractor tread, reducing possibility of damage from undercuts and washouts. Blade adjustable for bulldozing earth straight ahead or at angle of 30 deg. to either side, cutting path with ample overlap beyond outside edges of tracks. Raising and lowering of blade controlled by single lever. Safety throwout prevents damage from overrun in raising. When not in use, blade may be secured in raised position or whole assembly removed. Length of blade, 104 in.; cutting width, full front, 104 in.; at 30-deg. angle, 90 in.—Trackson Co...
Milwaukee. Wis.

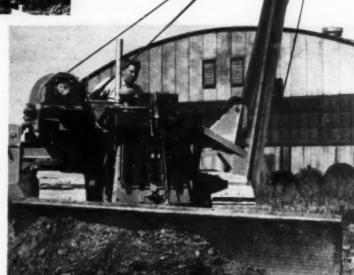


frame permits use of one line to dipper, eliminating dragging of bail block. Dipper width with standard side cutters is 36 in. and may be in-creased to 42 in. Maximum digging reach, 32 ft.; digging depth, 18 ft. Maximum dumping height, 18 ft. 3 in.

— Koehring Co., 3026

West Concordia Avo..

Milwaukee, Wis.



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> SAFETY CLIMBERS (above and SAFETY CLIMBERS (above and in inset), of lightweight steel construction and embodying cushion contact feature are used on construction or repair work involving climbing of poles, masts or steel work. Manufacturers claim following advantages over former types of such equipment: (1) Will not dig into and mar painted surface; (2) cut maintenance bills as less painting is necessary; (3) as less painting is necessary; (3) ease and safety of operation; (4) no excess weight; (5) interchangeable on ordinary or reinforced poles; (6) can be worn all day on job. — Service Supply Corp., 20th and Venango Sts., Philadelphia.



STONE AND CHIP SPREADER spread sand, stone, chips, slag and gravel at any desired rate per square gravel at any desired rate per square yard covering any width from 6 in. to 8 ft. with truck moving forward or backward, regardless of truck speed. Unit consists of steel hopper with gear control gate and operator's seat and is attached to truck with three bolts in bottom of and two on each side of truck body. All-steel construction with cast-steel fittings properly braced and reinforced. Full control from operator's seat. Weight, 390 lb. Handle for lifting spreader gate slides down to prevent interference in loading truck under low loading bins. — Temple Stone & Chip Spreader Co., 2335 Kutstown Road. Reading, Pa. Reading, Pa.

Further Information Requests for further information should be sent to:

The Editor, CONSTRUCTION Methods and Equipment 330 West 42nd Street New York, N. Y.

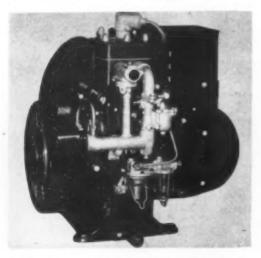
ALL-STEEL THREE-SPEED HAND WINCH (below), of 3-ton capacity WINCH (below), of 3-ton capacity for use in handling heavy machinery and saving man power. Weight, including crank, 75 lb. Drum holds 150 ft. of ½-in. cable. Gear ratios are 24, 4 and 1 to 1. In photograph two men have just loaded a 14-ton rock crusher on truck belonging to Milne Construction Co., of Portland, Ore. Without winch it would have taken a large crew of men to do this work.—Ramsey Machinery Co., 1626 N. W. Thurman St., Portland, Ore.

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Construction Equipment News (Continued)

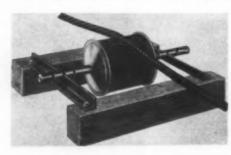
WATER-COOLED GENERATING PLANTS (a.c. & d.c.) are built in 500-, 1,000-, 2,000-, and 3,000-wait capacities and are particularly designed for marine installations. Features: Automatic choke; gasoline pump, extra silent muffler, and rubber mounting.

Offered with manual cranking or in self-starting Offered with manual cranking or in self-starting type with remote control. Alternating current mod-



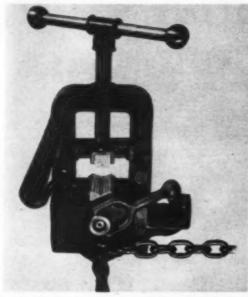
els furnish same kind of electricity as generated by city lines. Mechanism fully inclosed and stream-lined. Engines have bores of 21/4, 21/4 and 3 in., according to horsepower requirements of generator. Cooling water circulated by all-bronze gear-type pump with stainless steel shaft and roller bearings. Generators have constant voltage characteristic from full load to no load and are of low voltage, self-excited type. Single cylinder models equipped with special flicker removing device.—D. W. Onan & Sons. 43 Royalston Ave., Minneapolis, Minn.

RUBBER-COVERED WIRE-LINE ROLLER for jobs quiring smooth running wire lines may be installed at whatever point cable is encountering friction. Unlike wooden roller rubber-covered drum resists wear and operates freely. Absence of metal obvi-

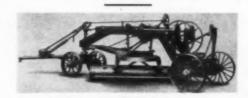


ates metal contact with consequent sparking and fire hazard. Bearings need no lubrication as shalt housing has permanent grease pack. Impossible for roller to get out of alignment. May be adjusted from side to side by moving shalt to different slot adjacent to rails. Dustproof and waterproof.—Patterson-Ballagh Corp., 1900 East 65th St., Los Angeles.

POST VISES that lock tight to columns, pillars or posts up to 10 in. in diameter are now available for jobs where pipe bending and cutting are done more conveniently on job than in shop. Snap of chain and turn of locking handle sets vise on post or column. Frictionless cup takes up all slack and makes easy locking and releasing of chain. Each vise has broad jaws which grip pipe tightly. Frictionless disk between upper jaw and base of screw assures easy, tight grip of pipe. Four-point slide bearing permits quick adjustment. I-beam stream-



lined structure for reducing weight and preserving strength. Two types: Side open post vise which holds pipe from ½ to 2 in.; hinged model, (illustrated) for pipe from ½ to 2½ in. Both models equipped with ¾-in. pipe bender.—Armstrong Manufacturing Co., Bridgeport, Conn.



NEW MODEL BLADE GRADER has standard 8-ft NEW MODEL BLADE GRADER has standard 8-ft. blade, weighs 5,900 lb. and is said to offer unusual flexibility and rapidity of blade movement. Blade can be moved from ditching to high bank cutting position without being offset on beams or changes made in supporting links. Operator does not need to leave his platform or stop tractor to change blade position. — Caterpillar Tractor Co., Peoria, III.

SPECIAL BODY mounted on Dodge truck is designed for large passenger capacity in engineering, construction, public utility and other fields. Unit shown accommodates at least 15 persons, including driver. Seat cushions are on hinges and beneath



each is large compartment for luggage, tools or other necessities. In rear is spacious compartment of 45-cu.ft. capacity which opens at rear and is large enough for hauling of bulky objects. Tarpaulin top may be mounted in few minutes and side curtains attached and detached with little effort. Rugged construction of truck makes it adaptable to all types of country and roads.—Dodge (Div. of Chrysler Corp.), Detroit, Mich.



CALKING GUN for calking boats, windows, doors and boilers, for glazing, pointing brick walls, and greasing has been improved by cutting working parts to minimum and by installation of swivel hamilton proving a particular which permits operation. which permits operation from any angle facilitating and speeding operations. New style side-button, thumb pressure release stops flow of contents and variable leverage of trigger permits increase of pres-sure with slight effort. Entire gun may be taken apart in few minutes for cleaning. Compensating adjustment screw takes up all wear on trigger. Finished in rustproof cadmium plate.—Albion Mig. Co., Al-bert & Martha Sts., Philadel**HEAVY-DUTY TIRES** for light trucks of $\frac{1}{2}$ - and $\frac{3}{4}$ -ton capacity are manufactured in answer to demand for "truck tires for truck service" eliminating ne-

cessity of using passenger car tires or having machines "changed over" for special size truck tires. Use of new tires also enables cars to be operated without speed restrictions necessary for efficient operation of trucks equipped with pas-senger car tires. Othsenger car tires. Other advantages of new tires: Tread, 22 per cent wider; tire, 11 per cent heavier, more rubber, traction, safety and mileage; less skid; no wheel changes; greater resistance to bruise breaks. Complete range of sizes



plete range of sizes to fit present equipment rims in 16-in. wheel diameters as follows: 6.00-16; 6.50-16; 7.00-16; and 7.50-16. All are made in six ply and last size is available in eight plies. Special tubes available for use with these tires.—B. F. Goodrich Co., Akron, Ohio.

FULL OR SEMI-TRAILERS from 5- to 50-tons capacity are offered in drop, kick-up or flat platform models for various haulage requirements. Electric cast-steel castings. Deeper main beam sections and more cross-members insure ruggedness and strength with-out increasing weight. Heavily reinforced, cast steel, dual-type wheels of small diameter keep trailer bed low for easier loading and handling. Number of



wheels varies from four to twelve according to trailer size. Rear wheels arranged on single, tandem or dual-tandem axles, as required. Tandem-axle design has wheels mounted on special rocker arrangement to assure even distribution of load. Heavyduty trailer has large diameter fifth wheel mounted in silica manganese alloy springs. Brake drums cast integral with wheels. Internal expanding brakes operated by brake wheel or lever. Vacuum or air power brakes available. Standard equipment on all trailers: loading ramps, lash rings, Alemite or Zerk pressure grease fittings, safety chains.—C. R. Jahn Co.. 228 N. La Salle St., Chicago, Ill. wheels varies from four to twelve according to trailer



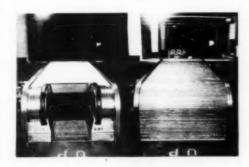
TRANSFORMER-TYPE ARC WELDER, 150 amp. a.c., is now available in capacities of 150, 300, 500, 750 and 1,000 amp. Complete self-contained units that need no other accessories except welding cable, electrode holder and hand shield. Distinctive feature: system of three controls or adjustments of welding current. Through medium of first two controls it is possible to obtain twenty-five coarse adjustments. Third control offers further and finer adjustment of current values within any of twenty-five mentioned. By means of these three controls many settings may By means of these three controls many settings may be obtained.—Wilson Welder & Metals Co., Inc., Lincoln Bldg., New York City.

COATED ELECTRODES especially adapted for alternating current welding are available in sizes from 3/32 to 5/16 in. in diameter and in two grades of black and brown. All offer advantages of arc stability, low spatter loss, high tensile strength and



high ductility of deposit. Black electrodes are suitable for down hand butt welding because of high melting rate and ability to operate at high current values, and for producing high grade weld deposits on surfaces sloping as much as 30 deg. Also satisfactory for horizontal fillets. Brown electrodes recommended for general purpose horizontal, vertical and ovehead welding. Especially adapted for fillets, single or multiple pass. Special 1/16-in. electrode for use with low current values is useful for all around repair work.—Westinghouse Eectric & Mig. Co., East Pittsburgh, Pa.

FIREPROOF STEEL SHUTTER COVERS for escalators solve problem of inclosing shafts in manner conforming to requirements of building codes, labor departments and insurance companies. Opens and closes in from 8 to 12 sec. by means of cables winding on drum and operated by detachable hand



crank. When escalator is open, cover coils on horizontal shaft in rear. Fuse link releasing closing weight closes shaft automatically in case of fire. Speed of closure controlled by governor if desired. May also be operated electrically.—Cornell Iron Works, Inc., 36th Ave. and 13th St., Long Island City, N. Y.

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ed ay BURST-PROOF STEAM HOSE guaranteed by its makers not to burst except as result of external blow sufficient to cut wire reinforcement. Recommended for 200-lb. working pressure in all sizes with safety factor of 15 to 1 in. larger diameters and 35 to 1 in. small diameters. Tube A and insulating layers C and E are made of special heat-resisting rubber



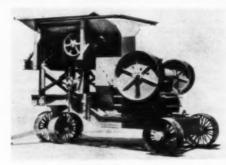
compound which retains liveliness and sealing properties when subjected to high pressure steam. Reinforcement B and D consists of seven or eight strands of high tensile steel wire in braided form with openings large enough to permit rubber to rivet itself preventing tube collapse. Outside wire braid and underneath cover is embedded additional braid of strong asbestos cord, F, which protects cover from burning. Cover is of heavy, black rubber compounded with Agerite, a special anti-oxidant for age-resisting purposes. Available in sizes ranging from 1/8 to 21/2 in.—B. F. Goodrich Co., Mechanical Rubber Goods Div., Akron, Ohio.

ARC WELDERS in three models: (1) operates on 110- or 220-volt 60-cycle alternating current, delivers 20 to 175 amp. and handles 1/16- to 3/16-in. electrodes. Overall dimensions, 14½ in. wide, 15 in. high, 22½ in. long. Unit with equipment weighs 202 lb.; (2) operates on 220- or 440-volt alternating cur-

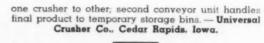


rent, delivers 25 to 225 amp. and handles 3/32- to 1/4-in. electrodes. Mounted on rubber-tired wheels for easy handling. Height overall 38-in.; width 18 in.; depth 18 in.; and weight, less equipment, 280 lb.; (3) designed for all-around shop welding. Delivers more than 325 amp. with 5/16-in. electrode and may be aut down to 30 amp. for light work with 3/32-in. rod. Height, 42 in.; width, 20 in.; depth, 370 lb.; weight; less equipment, 370 lb. Mounted on rubber-tired wheels.—Glenn-Roberts Co., 1009 Fruitvale Ave., Oakland, Calif.

FEEDER CRUSHER UNIT for large high-production rock crushing operations involves use of Universal primary jaw crusher mounted on portable rig, with apron feeder superimposed above it permitting



steady feed of rock into crusher. Apron feeder said not only to speed up output by maintaining steady flow of rock to crusher, but to save much time formerly required in setting up and dismantling stationary feeders. This combination crusher and feeder mounted on single mobile unit also operates in conjunction with similar crushing equipment on



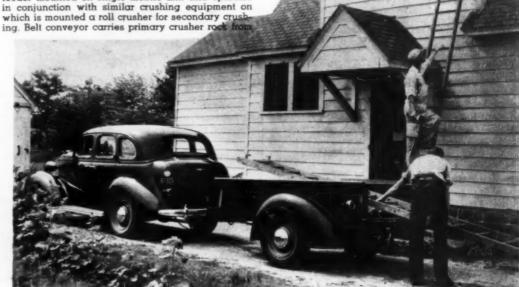
CAB-OVER-ENGINE DUMP TRUCK for city work is mounted on 1½-ton chassis with 108-in, wheelbase. Dump body is hinged horizontally for greater capacity and ease in loading bulky materials. Slanting rear also gives unit greater load space Equipped with hydraulic hoist. Short wheelbase provides small turning radius and greater facility for handling where little space is available.—Dodge (Div. of Chrysler Corp.). Detroit. Mich.



BRONZE FLO-CONTROL VALVES, combination flow instrument and shutoff valve, are suitable for use in temperature control on all types of gas-fired oil-fired or steam-heated processes; for proportional blending of liquids, water softening systems and



oil burner lines. Valve seats and disks are of heattreated stainless steel of 500 Brinell hardness (wear-resisting feature) and are said to smash nails, pipe turnings welding chips and boiler scale without showing slightest mar (see CONSTRUCTION Methods & Equipment, p. 53, July, 1937). Valves have new body of Union Bonnet type instead of original inside screw bonnet. — Hancock Valve Div., Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn.



UTILITY TRAILER known as "Trailabout," commercial and general use, has capacity of 1,000 lb. and hitches either to passenger cars or trucks. Wide range of utility offered by choice of two body lengths and four body arrangements to meet needs of contractors, carriers of heavy and bulky materials, tourists and campers. May be obtained either with or without springs. Folding leg holds trailer in position when detached. Standard pick-up body forms base of three other styles. One carries side screens; another is fully screened; third is equipped with stake racks. Six-inch tires, full skirted lenders, license bracket and electric tail lamp, standard equipment. Special oversized ball-and-socket hitch unit can be locked against thelt. — General Motors Truck Division, Detroit.



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. COMPLETE LISTS COVERING INDUSTRY'S MAJOR MARKETS

Construction Equipment News (Continued)

TAMPING ROLLER built in three sizes, single drum, double drum, and double drum oscillating type, is equipped with special removable shoes and heavy-duty radial and thrust ball bearings which reduce maintenance and silvers and silvers are served. reduce maintenance and oiling cost to minimum Feet are welded to drum proper and are provided Feet are welded to drum proper and are provided with removable shoes made of SAE-4140 steel. Feet and socket on shoe are designed with taper. Shoes are driven on and edge of socket is peened over into depression in side of foot, securing shoe in place on foot and preventing shoe from coming



loose or turning. Ease with which old shoes can be removed and new ones installed makes it possible completely to replace the shoes at any time or place. Bearings supporting drum are of sealed type requiring no lurther lubrication. Component bearing parts are assembled in cast-steel housing, sealing lubricant in and dust and dirt out. Each assembly is held to drum by six bolts while bearing proper is locked on drum shaft. Thrust component held by bearing makes acute angle operation possible. Cleaning rake for each drum is standard equipment on all models.—Southwest Welding and Manufacturing Company, Inc., Alhambra, Calif.

IMPROVED POWER HOIST, for truck mounting, is recommended by its makers for speedy hoisting operations such as loading and unloading pay loads on trucks or trailers. Also as portable unit for erecting steel, hoisting concrete and material cages, drop hammer piledriving, and other hoisting



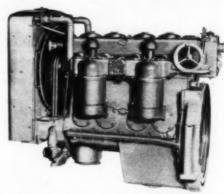
jobs. Outstanding feature in addition to all-steel construction, is powerful friction clutch developed and patented by manufacturer. Not only greater power is claimed for this auxiliary, but also elimination of friction common to conventional friction nation of Inction common to conventional inction clutches, with resultant smaller power losses and minimum wear of moving parts. Power is transmitted from truck engine by power take-off bolted to side of truck transmission. Either single speed or two speeds forward and reverse power take-offs available. Hoist proper is mounted directly behind driver's cab on main channel frame of truck, and operating levers are installed so operator can stand either on running board or on ground, facing hoisting operation. — Ramsey Machinery Company. 1626 N. W. Thurman Street. Portland. Ore.

SPEED-PRIME PUMPS in capacities ranging from 7,000 to 125,000 g.p.h. and with two-wheel and four-wheel trailer and wheelbarrow mountings for construction use, have four new features: (1) Positive



recirculation cut off assuring full capacity performance; (2) patented "peeler" which is said to peel air from propeller when pump is priming or when suction line is leaking air; (3) larger, more compact recirculation chamber; (4) impeller of Z-metal which resists water corrosion and soil or sand abrasion. Gasoline or electric powered.—Chain Belt Co., Milwaukee, Wis.

DIESEL ENGINE for construction operations is made in two sizes, four-cylinder model for uses requiring up to 100 hp. continuously and six-cylinder unit requiring 150 hp. continuously. Single control wheel acts as throttle and operates gasoline starting mechanism permitting change from gasoline to diesel oil, as desired. Governor actuated by oil pressure acts as automatic cutoff for low lubricat-



ing oil supply stopping engine if oil pressure fails. Heat exchanger between cooling water and lubricating oil gives quick warm-up in cold weather and prevents overheating on warm days. Alloy metal insulating cup on piston head shields body of piston from heat of combustion, protecting lubricating oil from breakdown. Use of unit fuel injectors on each cylinder without high pressure fuel lines eliminates irregular injection, dribbling and other injection faults and enables engine to avail itself of advantages of plain, open combustion chamber.—

Murphy Diesel Co., Ltd., Milwaukee, Wis.





RAPID-ACTION COUPLINGS have made practicable use of portable air mains for conveyance of compressed air for operation of ballast tampers, riveters, drills, hammers, paint sprayers and other tools in railroad construction and maintenance and for carrying gas, oil or water in temporary lines. These mains are light in weight, 20-ft. section weighing 53 lb. and will handle air pressures between 80 and 100 lb. Photographs show how lengths of pipe are quickly joined without tools.—California Corrugated Culvert Co., Berkeley, Calif.

News from Manufacturers

ABOUT THEIR PRODUCTS

The publications, reviewed below, will keep you posted on latest developments in con-struction equipment and materials available for your use.



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DRILL STEELS—SKF Steels. Inc., 369 Lexington Ave., New York, N. Y. (44 pp. illustrated). Photographs steps in manufacture of hollow drill steel by A. B. SKF-Hofors Bruk patented metal core method to produce product of higher tensile strength and permitting use of lighter, sections and reduction in bit diameter for higher drilling speed. Tables give dimensions, sections and weights of hollow and solid drill steel. Instructions for forging and heat treating, hints for drill steel up-keep and methousers and users of rock drill steel.

DROP-FORGED WRENCHES—J. H. Williams & Co., 75 Spring St., New York City. (184 pp. illustrated) Describes entire industrial line of drop-forged tools and other standard stock specialties. Included are many additions to the carbon and alloy wrenches, detachable "Supersocket" wrenches and "Agrippa" tool holders. New lines listed are as follows: Adjustable wrenches, both carbon and alloy steel; non sparking safety wrenches (beryllium copper); "superector" reversible ratchet wrenches, with detachable sockets, for severe service. Also two new lines of Vulcan chain pipe tongs: (1) "Supertongs" of alloy steel and (2) "Zephyr" lightweight tools; (3) "Superchain" models of greatly increased strength.

MATERIAL HANDLING PLANT ACCESSORIES—
lowa Manufacturing Co., Cedar Rapids, Iowa. (16 pp. illustrated). Contains information in detail on horizontal vibrating screens; revolving screens; steel trucks; bucket elevators; conveyors, lattice and channel frame type; portable stock piling and field conveyors; feeders, both rock and gravel; steel bins; material carts called "Rokarts" for hand-labor quarrying operations; drag-scraper buckets and accessories; special hoppers and grizzlies; drag-scraper sand tanks and V-belt drives.

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ELECTRIC PIPE-LINE WELDING — Lincoln Electric Co., Cleveland, Ohio (14 pp. illustrated). Bulletin entitled, "Building Better Pipe Lines Faster at Less Cost by Shielded Arc Welding," gives latest information on construction of oil, gas and water

lines. Brief foreword reviews prog-ress of electric welding in pipe line construction since 1928 when first major pipe line was electric welded. Increasing use of process illustrated by chart showing percentage of electric welded lines to total built in last 8 years. Short explanation of modern shielded are process electric welding and supports of tests of pipe we



explanation of modern shielded arc process of electric welding and summary of tests of pipe welds made by this process. Tabulated data include:—recommended sizes of electrode for pipe-line welding, average speed for shielded arc welding, recommended amperage and voltage for various sizes of rod, pounds of electrode per weld and recommended spacing for pipe. Two pages of specifications developed by pipe-line construction company for arc welding of oil, gas and water pipe lines.

FRICTION CLUTCHES — Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. (16 pp., illustrated). List-price catalog, besides giving sizes, dimensions, weights, horse-power-ratings, and other pertinent tabular data on both Meeseco and Twyncone types of clutches, devotes two pages to the subject of how to select and order the right clutch for the service.

GRAVITY CONVEYORS - Standard Conveyor Co. GRAVITY CONVEYORS—Standard Conveyer Co., North St. Paul, Minn. (8 pp. illustrated). Time- and money-saving applications of gravity and roller conveyors in building supply yard. Contains photographs showing solid mass of bricks three, four, and five abreast carried directly from kiln to storage pile; cars of lumber unloaded and moved about yard; shingles, pipe, flue lining, gypsum tile, bundles of lath handled by gravity and roller conveyors. DIESEL GENERATING SETS—Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. (16 pp. illustrated): Describes and illustrates construction and application of sets widely used (1) in individual plants either as

independent units or in conjunc-tion with other electrical service; (2) on machines requiring indi-(2) on machines requiring individual power plants, such as electrically operated shovels and dredges; (3) as portable and semi-portable electric power plants on construction work. Alternating current sets with ratings from 5.3 to 100 kva. and direct current sets of 5 to 80-kva. are offered.

WATER-WORKS MANUAL — The Youngstown Sheet & Tube Co., Cleveland, Ohio. (120 pp. loose-leaf, illustrated). Practicable data about special wrapped and lined steel water mains and technical information for engineers and water-works' officials, public and private utilities, governmental units and industrial users of water mains. Useful tables and charts covering basic hydraulic information and engineering data used in water mainflow capacity and pipeline connections. Subjects discussed: records of service of steel pipe in water mains, laying methods, corrosion, tuberculation, incrustation, leakage and breakage factors, carrying capacity, cleaning and senitation, coating and wrapping, linings, couplings and joints, fittings and service connections and other useful data. Copies of manual available to engineers and officials interested by writing Water Works Division of above company.



NON-METALLIC SHEATHED CABLE—Anaconda
Wire & Cable Co., 25 Broadway, New York City.
(20 pp. illustrated). Describes fully complete line of
"Duraseal" cables sheathed with
fibrous materials to prevent mechanical damage and mold and
rot by organisms in underground
or aerial installations. Lists types
available, gives general, guide for available; gives general guide for selection of proper type cable; describes and illustrates applicadescribes and illustrates applica-tions and, laboratory performance tests; covers jointing instructions for high and low voltage cables. Tabulations of physical properties of various types, of thicknesses of rubber insulation for power cables,

of current carrying capacities of underground cables and of reactance of three-conductor cables.

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POWER SHOVELS — CRANES — Bay City Shovels. Inc., Bay City, Mich. (Five 6-8 pp., bulletins and single specification sheet). These publications cover various sizes and types of Bay City crawler-mounted shovels, cranes, draglines and trench hoes, including shovels of %-, ½-, %- and ¾-cu.yd. capacities and cranes in sizes of 4, 6, 7½, 8 and 10 tons. New models include the No. 32 %-yd. shovel or 6-ton crane (respective weight, 32,500 lb. and 30,500 lb.) for service where a lighter weight machine than the company's model 38 heavy-duty %-yd. machine, (weighing 39,000 lb.) is desired. Gas, diesel or electric power. Also new is model 42, a ¾-yd. shovel or 8-ton crane of lighter weight (42,000 lb.) than the company's model 45 shovel, weighing 45,200 lb. Embodies all refinements and improved mechanical features of heavy-duty unit.

CONCRETE VIBRATORS — Mall Tool Co., 7740 South Chicago "Ave., Chicago, Ill. (24 pp., illustrated). Units of spud type to suit variety of concrete placing problems. Powered with gas engine, compressed air or electric motor, transmitting power to vibrator by flexible shafting. Suggestions on concrete mixtures to get best results by vibration. Gas engines are 3 hp., on round base or pneumatic tire mounting. Electric vibrators are equipped with 1½2- and 3-hp. motors. Air-operated vibrators recommended for tunnels, caissons and other deep construction. Power units are multi-purpose machines, adaptable, with units are multi-purpose machines, adaptable, with proper attachments, to concrete surfacing, sawing, drilling or operating sump pump. Notes on producing denser, stronger concrete by vibration. Specifications and prices are given.

DROP FORGED PIPE FITTINGS—Bonney Forge and Tool Works, Allentown, Pa. (15 pp. illustrated)
Illustrates and describes WeldOlets and ThredOlets, patented stock welding fittings used in making pipe connections. Photographs showing installations and welding of pipe fittings to form clean unobstructed outlets. Lists many applies. and outlets. Lists many applica-tions in manufactured products made possible by ease of instal-lation and low cost. Tables of stock sizes dimensions and



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• View of Monongahela River Lock No. 2 looking upstream

THE Monongahela River, main traffic artery through the busy Pittsburgh industrial area, is studded with locks to facilitate the several million tons of shipping that move up and down stream every month.

Drainage from mines, mills, etc. that line its banks present a serious maintenance problem to Army Engineers. Drainage from these contaminates the water, making it highly corrosive. As a result, metallic parts of lock equipment deteriorate rapidly.

Plain and low alloy cast irons which have been used for butterfly valve frames do well but not well enough. Replacements are usually made after very short service.

Recently U. S. Engineers decided to test other 5 materials, found that much better corrosion resistance was offered by Ni-Resist,* a special Nickel



• Ni-Resist frames assembled and ready for installation



Cast Iron composition containing approximately 14% Nickel, 6% copper and 2% chromium.

Twelve Ni-Resist butterfly valve frames, consisting of twelve tops, twelve bottoms and twenty-four side castings weighing a total of 40,000 pounds, were ordered and have been installed. These castings were produced by Youngstown Foundry and Machine Co., Youngstown, Ohio. This is just one of many applications where Ni-Resist has proven definitely superior in combating corrosion. It is equally effective in equipment designed to handle corrosive vapors and gases.

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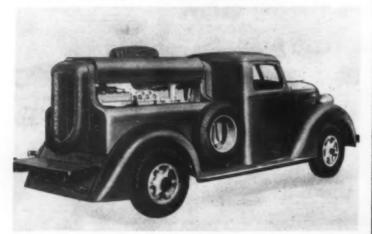
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The only Diesel motor grader that can be started and operated from the cab just like your car.

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All power is delivered to wheels. No loss of power—all weight carried on housing.

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No jumping down over wheel at side. Improved location of controls for visibility and accurate work. ACCESSIBLE

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A-W 66 Motor Grader carries forward all the desirable features for which its predecessors have been internationally famous and adds sterling new features. It is the latest, most modern motor grader of its class. Power, the Buda-La Nova Diesel, or International Harvester Motor which starts exactly like your car, no getting out of cab to make adjustments, no cranking or delays. Simply press the starter and this motor grader is in operation.

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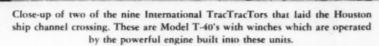
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Again International TracTracTors Score a Beat!

LAY 8 LINES OF PIPE Across the Houston Ship Channel in 3½ Hours





A view of the multiple assembly of pipe on the starting side of the channel with two International T-40 TracTracTors in action, pulling this mass of steel.



These two International T-20 TracTracTors held the pipe assembly in position as it was being pulled over the rollers on the starting side and unreeled the cable from the winches on the Model T-40's.



The International TracTracTors provided a steady flow of power to the winch lines during the big pull when every



The multiple pipe line as it was landed on the receiving shore side, just about ready to be tied into the main line system.

of pipe totaling

ing approximately 1,500,000 pounds with their rust-resisting wrappers and anchor weights lay parallel on the banks of the Houston ship channel near Baytown, Texas, one morning, waiting to be pulled in one mass across the channel which is over a quarter of a mile wide and 50 feet deep at this point.

For weeks, engineers and workers had prepared for this moment, making every possible arrangement so that this project, one of the biggest of its kind ever attempted, would go through without a hitch. Time was a vital factor. The War Department had given permission to suspend all ship traffic on this busy waterway for five hours. The job had to be finished in the allotted time. Actually, the crossing was made in three and a half hours.

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the pipes entered the water, the ends were secured to a barge and pontoons and thus directed across the channel. When the job was finished, a diver went down under and came back with the report that everything was okay. The difficult crossing was handled perfectly in record time.

Nine INTERNATIONAL TracTrac-Tors were on this job. Five Model T-40's equipped with winches rated at 50,000 pounds each on a straight-line pull did the pulling. They were assisted by four Model T-20 TracTracTors. Three of the T-40's and two T-20's were on the starting side of the channel. Nearly a halfmile away on the other side were the other TracTracTors, the two T-40's with their winch lines connected to the forward end of the pipe assembly. After each pull of about 400 feet by the five T-40's, the T-20's rushed in and pulled the lines from the winches. These smaller Trac-TracTors were also used to keep the multiple pipe assembly from sliding off the rollers on the starting side.

INTERNATIONAL TracTracTor power and stamina on the job is the best recommendation of their ability to handle your work. Find out more about TracTracTors and what they can do from the nearby industrial power dealer or Company-owned branch. The INTERNATIONAL Industrial Power line includes wheel and crawler tractors (gasoline and Diesel), and power units (gasoline, Diesel, natural gas, and distillate) ranging up to 110 max. h.p.

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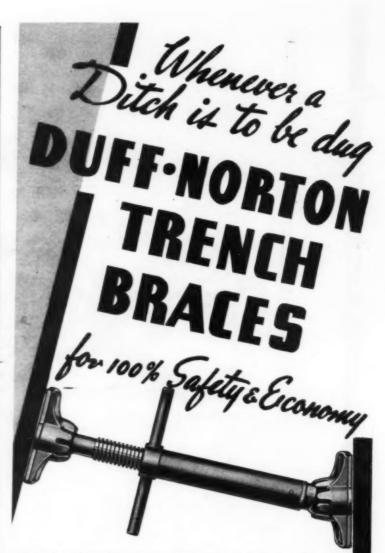
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• J. A. Lyons, Portland, Oregon, contractor, says his Alemite-equipped lubrication service truck slashed lubrication time for each of his big Diesel tractors from 45 minutes to 15 minutes!

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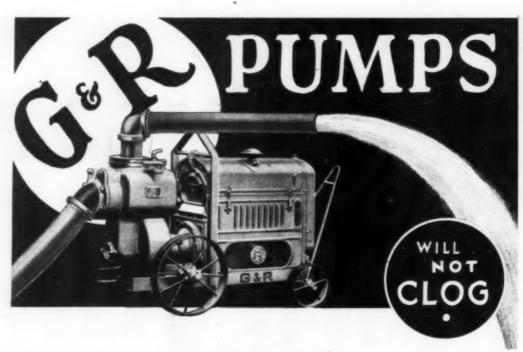
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PERFORMANCE NOT CLAIMS For Claims DO NOT PUMP WATER



The place to form an opinion of any pump is out on the job. There the pump must do its own talking, and with dirty water many a pump is inclined to stutter — and stop.

The Acme Construction Company of Everett, Washington, recently bought ten pumps. As they wanted to know what they could expect from the pumps on the job, they tried three well known pumps under identical conditions. When all three pumps had told their own

story, Acme bought G & R Pumps.

Arundel Corporation of Baltimore made a similar comparison of pump performance. They bought 15 G & R Pumps.

Remember this about G & R Pumps — THEY WILL NOT CLOG — THEY ASK NO TIME OUT. Play safe! Try a G & R Self Priming Centrifugal on your job before you buy any pump this year. We will ship you one and let you be the judge.

The most DEPENDABLE pump for the least money.

THE GORMAN-RUPP COMPANY, MANSFIELD, OHIO

"WHY NOT?"



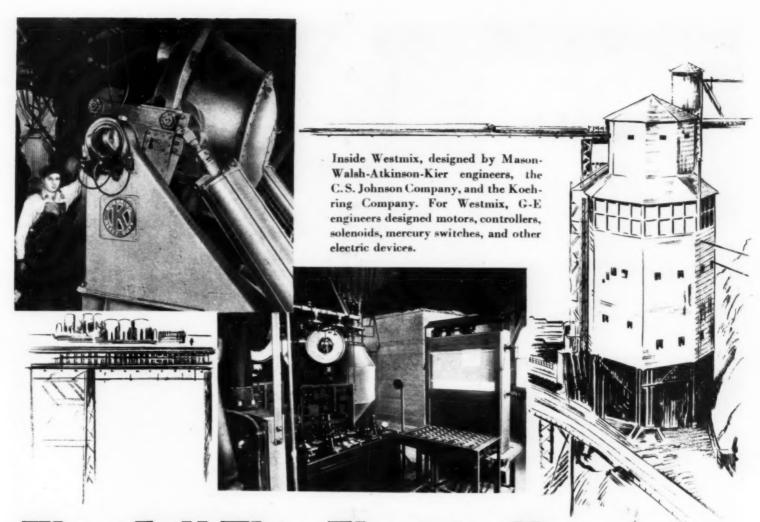
Why not have a modern "FLEX-PLANE"

Finishing Machine? It is certain in the future a wide screed and back screeding will be required. Common sense says so.

FLEXIBLE ROAD JOINT MACHINE CO.

WARREN . OHIO





They Call This Electrically Operated Mixer 'MAGIC'

BECAUSE its operation is so automatic, because it produces such an immense quantity, and because it "works like a charm," the first concrete-mixing tower at Grand Coulee is called "House of Magic" by the workers.

This borrowing of a term applied to the G-E Research Laboratory is a high tribute to the speed and efficiency which electricity makes possible in this concrete-mixing plant.

From the selection of aggregates to the pouring of the completed mixture, the entire operation can be controlled at a central dispatcher's table. And it can be arranged in advance to produce eight batches of any of five different mixtures. Westmix was designed by MWAK engineers in co-operation with the C. S. Johnson Company on the batch plant and the Koehring Company on the mixers, using a system of G-E motors and control engineered by General Electric.

This application is typical of the co-operation of General Electric with machinery manufacturers, and with contractors, to make possible the greatest speed, economical operation, and high-quality work.

On jobs in which you are interested, let General Electric engineers—located right in your territory—assist you. Call the nearest G-E office, or write General Electric, Schenectady, N. Y.

TO GET SPEED FOR THE JOB, COMPLETE SERVICE FOR YOUR MONEY, SPECIFY GENERAL ELECTRIC EQUIPMENT

011-165A





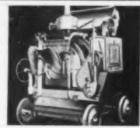
is MOBILE, SPEEDY, POWERFUL AND STURDY

Write today for details Insley Manufacturing Corporation 801 N. Olney St., Indianapolis, Ind.

EXCAVATORS



--- PROFIT MAKERS NEW CMC MIXERS



CMC 7s and 10s End Discharge Models. New—compact—fast. The advantages of a speedy trailer with four wheel stability.



CMC 5s - 7s - 10s Two Wheelers. The fastest moving - fastest working one and two bag Mixers ever developed.



GET THOSE JOBS DONE IN A HURRY!

Don't take chances with old, wornout equipment. See the new, fast, completely modernized CMC line of Mixers — all sizes—Wonder Tilters, Dumpover Pneumatic Tired Carts (See Illustrations), Hoists, Pumps, Saw Rigs, Wheelbarrows.

Write Today For Latest Catalog.

CONSTRUCTION MACHINERY CO.



FOR MODERN ROADWORK

...at Low Cost

This plant was designed to meet the demand for the economical improvement of secondary roads. We have built several to date and they have proved their worth in actual service. No investment is needed for a running gear, plant adapted to standard flat bed truck and trailer hauling.

Some Details

- Can be erected by 3 or 4 men in a few days.
- No erection equipment required. Plant equipped with hoist and jib crane.
 Built in 2 units (dryer
- Comply with most high way loading and clearance regulations.
- SKF bearings throughout. Fully enclosed vibrating screen. Steamjacketed, steam-operated steel mixer. Large combustion chamber and dust rolliester.
- Write for Bulletin T-258.

HETHERINGTON & BERNER, INC.

701-745 Kentucky Avenue

Indianapolis, Ind.

The Tops in Economy

"FLEX-SET" PREFORMED YELLOW STRAND

Cast up the final cost—the REAL cost—of "Flex-Set" Preformed Yellow Strand, and you will find it the most economical of all wire ropes on power shovels, dragline scrapers, hoists, all material handling machines.

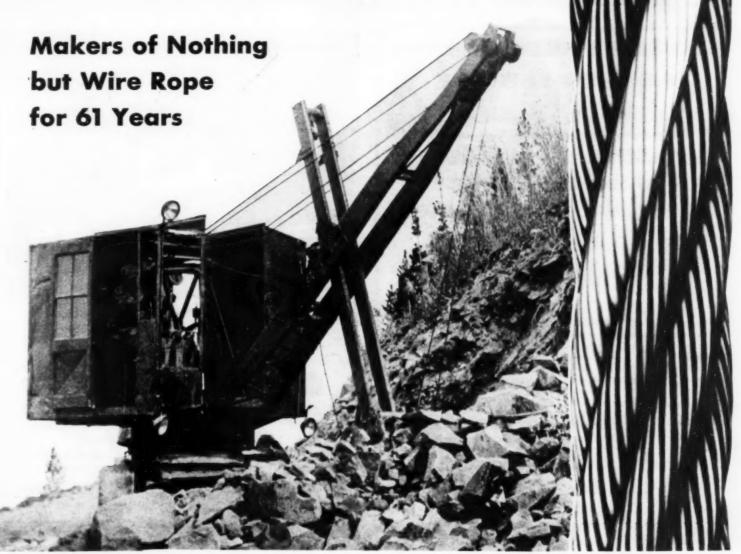
It's the same super-rope that has been saving contractors money for many years
—with this difference: The wires and

strands are pre-shaped to the helical form they occupy in the finished rope.

This makes the rope limp, tractable, easy to handle, easy to install — practically pre-broken in; highly resistant to kinking, fatigue, drum crushing. Longer life and greater economy naturally result.

Let "Flex-Set" Preformed Yellow Strand show what it can do for you.

BRODERICK & BASCOM ROPE CO., ST. LOUIS
Factories: St. Louis, Seattle, Peoria. Branches: New York, Chicago, Seattle, Portland, Houston
V-16R2







"DIXON"
AIR HAMMER
COUPLINGS

"BOSS" HOSE COUPLINGS







Designed and built to withstand the continual vibration of hand hammers and rock drills, this Dixon coupling has a longer, consistently economical service life on the toughest job. And, like the "Boss," it is rustproofed by Cadmium Plating. Used for steam hose, steam hammers, air, hydraulic or road builders' hose . . "Boss" Couplings have no equal for dependability in service. Parts are of steel or malleable iron to withstand abuse . . Cadmium Plated for rust proofing.

Furnished in Washer or Ground Joint Type.

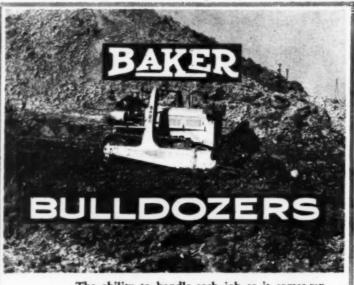
DIXON
VALVE & COUPLING CO.

LOS ANGELES

PHILADELPHIA

HOUSTON

Carried in Stock by Leading Rubber Manufacturers and Jobbers.



The ability to handle each job as it comes up with comparative ease has made Baker Bull-dozers and Gradebuilders the top selection of leading construction companies.

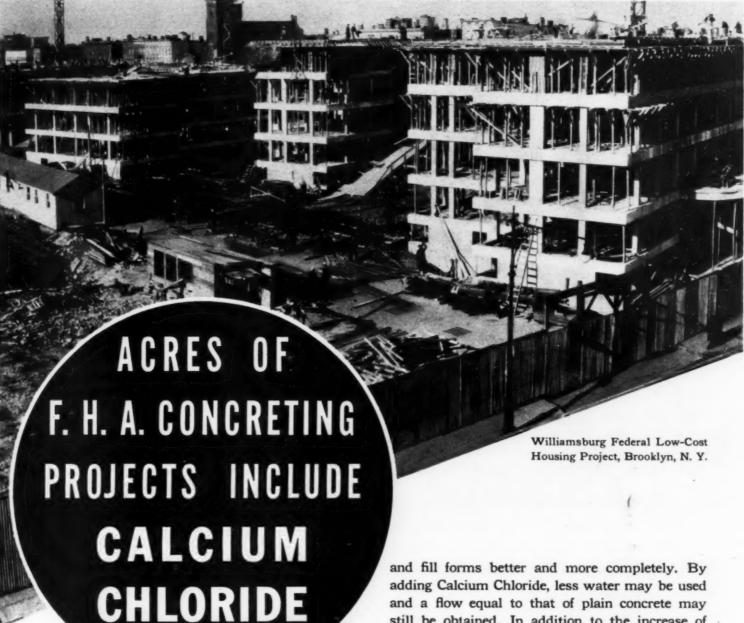
This simply-constructed Bulldozer with direct blade lift requiring no cranks, wheels, springs or levers and abounding in real money-saving features, will get you through the tough spots.

Ask for Baker Bulldozer Bulletins

OTHER BAKER PRODUCTS:

ROAD ROOTERS, ROAD DISCS, MAINTAINERS, HYDRAULIC SCRAPERS, SNOW PLOWS

THE BAKER MANUFACTURING CO. 568 Stanford Ave., Springfield, Illinois



SIMPLY stated, the reasons for the integral use of Calcium Chloride in extensive structural operations are:

Acceleration of set. • Higher early strength and greater strength at all ages tested • Greater plasticity and workability. • Improved finish.

These advantages are extremely important to engineers and contractors.

They assure better concrete, permit earlier removal of forms, permit continuous floor finishing adding Calcium Chloride, less water may be used and a flow equal to that of plain concrete may still be obtained. In addition to the increase of strength due directly to the addition of Calcium Chloride, there is a further addition in strength due to a decreased content of mixing water.

While all of these advantages are made plain in extensive tests by the National Bureau of Standards, there are many practical advantages to both contractor and workmen that save money and speed the work. Write for A.S.T.M. specifications, Bureau of Standards reports, and full data on the use of Calcium Chloride in Portland Cement Concrete.

CALCIUM CHLORIDE ASSOCIATION

Solvay Sales Corporation 40 Rector St., New York City The Columbia Alkali Corporation . . . Barberton, Ohio The Dow Chemical Company . . . Midland, Michigan Michigan Alkali Company . 60 E. 42nd St., New York City

CALCIUM CHLORIDE MODERN CONCRETE CURING

Built to Give MORE... Than You've Learned to Expect!



GOODALL "INFERNO" STEAM HOSE

"A Stranger to Fatigue and Failure!"

Your experiences with other kinds of steam hose will serve only to increase your respect for "INFERNO"... the hose that has established new records for safety, efficiency and economy in high temperature, high pressure steam service.

GOODALL INFERNO is a Steam Hose of massive construction, made of high-tensile asbestos cord, braided into and protected by the most efficient rubber compound modern science has developed. The safety of handling this hose is increased by the special construction which, if the hose is damaged, will cause the steam to be diffused instead of escaping in a sudden burst.

Recommended for pressures up to 200 lbs. and temperatures up to 400° F. Made and stocked in all sizes from $\frac{1}{2}$ " to 2" I.D., in maximum lengths of 50 feet.

GOODALL RUBBER COMPANY

5 S. 36th Street, Philadelphia, Pa.

New York • Pittsburgh • Chicage • Cleveland • Houston

GOODALL MECHANICAL CORP.

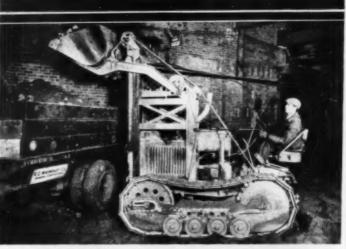
San Francisco • Los Angeles • Seattle

FACTORY: TRENTON, N. J.

GOODALL

The originators of the
"Standard of Quality" Line
(Reg. U. S. Pat. Off.)
of contractors rubber goods



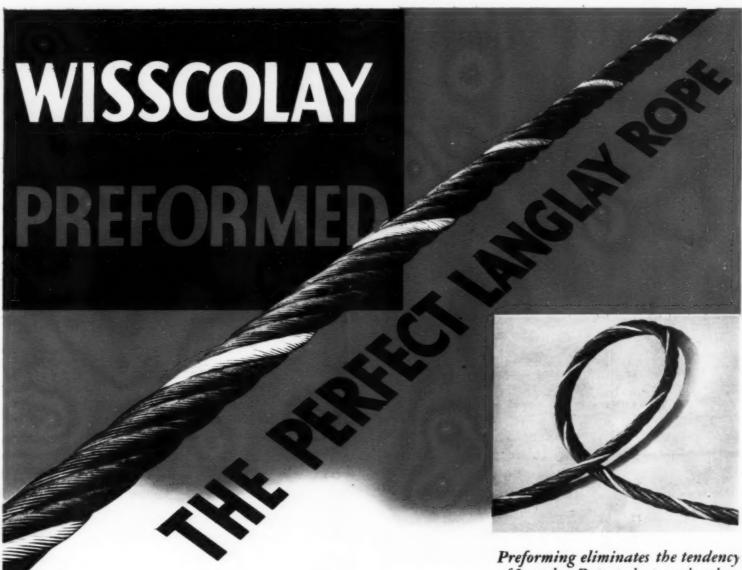


CLOSE QUARTERS

The Trackson High Shovel digs and loads in close quarters — in narrow cuts and under buildings where the overhead clearance is low — because it is compact, efficient and easy to handle. It is a sturdy excavator, equal to the toughest jobs — digging, moving and loading with amazing speed and economy. Always busy. A Money Maker the year round. Write Trackson Company, Dept. B, Milwaukee, Wisconsin, U. S. A.

TRACKSON HIGH SHOVEL





Select the Rope that Fits Your Job

In Langlay Wire Rope both the wires and strands are twisted in the same direction. When Langlay is not preformed there is a pronounced tendency of the rope to unlay... or become cranky. Preforming, however, "sets" the rope and eliminates

this tendency. Langlay Wire Rope is known for its remarkable ability to give long life under the adverse condition of frequent bending over small sheaves. In non-preformed rope its principal limitation is its tendency to unlay and to loop. With "crankiness" eliminated, Langlay Preformed becomes the most desirable rope to use in many places. Write us and

Preforming eliminates the tendency of Langlay Rope to loop and unlay.

we will gladly tell you where and when you can use it.

WICKWIRE SPENCER STEEL COMPANY, General Offices: 41 East 42nd Street, New York. Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles; Export Sales Dept.: New York.

WICKWIRESPENCER SALES CORPORA-TION, New York, Chattanooga, Tulsa, Portland, Seattle.





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41 E	ast 42nd	St., New Yo	rk City				
Pleas	se send n	ne my free co	opy of ye	our popul	ar, new	money	saving

Name	
Firm	
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THERE'S NOTHING LIKE EXPERIENCE



"Any company that has a hundred and sixty-three years of experience back of it, sure should know its stuff. For instance, you take shovels, they tell me that the original Ames Company started making shovels in 1774 and it looks to me like they'd know a mighty lot about shovels, 'cause the more you work at a thing the more you learn about it.

"I'm a shoveler and if there's one thing I'm particular about a shovel, it's the handle. I like a handle with a roomy grip and one that doesn't wobble. I've tried them all and from my experience ABW's Armor-D Handle is the best shovel handle made ... and the boss agrees with me."

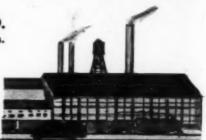
Just as ABW has learned from experience how to make the world's finest shovels, so have the men who buy and use shovels, learned from experience that ABW shovels have exclusive features which make them outstanding, dependable and of unequalled value.

AMES BALDWIN WYOMING CO. Parkersburg, W. Va. North Easton, Mass.

SHOVELS • SPADES • SCOOPS FORKS • HOES • RAKES POST HOLE DIGGERS



Armor-D The Perfect Shovel Handle









Placing Concrete with a Mall Universal Electric Vibrator

Gas engine, air and electric units can be furnished to help you secure better quality concrete at reduced labor and material costs.

Write for literature describing the various models.

MALL TOOL COMPANY

7757 South Chicago Avenue, Chicago, Illinois
Offices and Distributors in all Principal Cities



THEY HAUL THE BIG ONES ON GOODRICH SILVERTOWNS

Read How You Can Cut Trucking Costs

Where the loads are heavy, the hauls long and the roads rough—you usually find Goodrich Silvertowns. It's because these tires are specially built for the toughest kind of service—for tire-killing jobs. On construction jobs they use these tires where others won't stand up, put them through a third degree that batters to pieces anything but a super-quality tire.

Tires Triple Protected at Sidewalls

Every Goodrich Silvertown is Triple Protected against

sidewall breaks and blowouts. Triple Protection checks 80% of all premature failures. The sidewall—the spot that has always been the weakest in truck tires—is made just as strong as the tread! Think what that means in extra service, in savings on profit-eating repair bills!

Super-Traction Tires Pull Through Mud

Goodrich has a special tire for construction work—a Super-Traction Tire that pulls through mud, snow or soft ground. Sure-footed as a mountain goat. Provides extra long wear because of the oversize lug tread. It's a Triple Protected Tire, too.

No Extra Cost
No wonder truck owners

pick Goodrich Silvertowns when they can get Triple Protection at no extra cost! See the Goodrich dealer today. He'll quote you prices in line with what you've been paying.





HOW TRIPLE PROTECTION WORKS

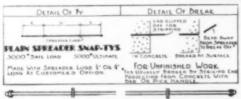
- 1 PLYFLEX—distributes stresses throughout the tire—prevents ply separation—checks local weakness.
- 2 PLY-LOCK-protects the tire from breaks caused by short
- plies tearing loose above the bead.
- 3 100% FULI-FLOATING CORD eliminates cross cords from all plies—reduces heat in the tire 12%.

Goodrich Protected Silvertown Silvertowns

CONSTRUCTION Methods and Equipment - October, 1937

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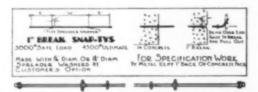




PLAIN SPREADER SNAP-TY FOR UNFINISHED CONCRETE WALLS. Equally practical on forms built in place and on panel forms of any type and size. The ¼ inch spreader is standard. If the tie is to be threaded through the forms, the ¼ inch spreades lug is used. This tie is also furnished without spreaders.



CONE SNAP-TY FOR SEMI FINISHED WALLS. Most efficient when a finished wall is required, and a cut back of ¼ inch is sufficient. It has a large bearing area, breaks off by bending only—and with a minimum of effort.



1° BREAK SNAP-TY FOR SPECIFICATION WORK. Used when specifications require that all metal in the ties be back 1 inch from the wall face. The standard spreader washer is 15/16 inch in diameter. An 11/16 inch diameter washer is available to order.



EXTRACT SNAP-TY FOR COMPLETE REMOVAL OF TY-ROD FROM WALL. Ideal where specifications require the tie-rod to be completely pulled from the wall, since the Extract Snap-Ty has only one break point—at the outside form spreader. Coated with a special compound to make removal easy. Also has the advantage of acting as a spreader.

Richmond is prepared to provide the proper tying device for every type of concrete wall work—and prepared to answer any inquiries you may want to make. Just drop us a line.



THE PORTER HEAVY DUTY CUTTER...LIKES 'EM TOUGH!



We have developed a special tool for those tough cutting problems that are to be found in construction work. The PORTER HEAVY DUTY CUTTER is ideal for cutting reinforcing rods and large wire cables. The cutting blades are reinforced by extraheavy drop-forged straps, and every precisely working, massive part is made to satisfy the growing demand for this tool in the construction in-

dustry.

These tools are designed to meet the extra tough assignments found in construction work. They are made in three sizes: No. 2 — 30", No. 3 — 36", and No. 4 — 42". A ratchet attachment is available for jobs where there is continuous cutting.

Own the toughest and most efficient portable Cutter on the market. Ask your dealer or write direct for complete specifications and prices.

H. K. PORTER, INC.
EVERETT MASS.

Established 57 Years



EVERY WIRE LUBRICATED

• Macwhyte has discovered a way to check two of the greatest wear factors in wire rope—internal friction and internal corrosion.

Each wire passes through heavy lubricant as it enters the stranding die. Wires are completely coated. The lubricant fills the spaces between the wires as they form the strand. High temperatures or freezing weather cannot injure this lubricant. Protected in this way, every wire and every strand resists corrosion and friction—the service life of the rope is extended.

Throughout the operation, emphasis is placed on high quality rather than high tonnage. This is one of the many reasons why Macwhyte PREformed Wire Rope gives such good service.

MACWHYTE COMPANY, Kenasha, Wisconsin • Manufacturers of wire rope and braided wire rope slings • Distributors and stock throughout the U. S. A. for quick service



Monarch WHYTE STRAND PREformed Wire Rope is specially designed for jobs where ropes must stand up under severe bending. Macwhyte manufactures special constructions for shovels, draglines, cableway excavators, scrapers, loaders, mixers, pavers, incline hoists. Macwhyte also makes specially designed non-preformed ropes.

PRE formed

MACWHYTE WHYTE STRAND

WIRE ROPE

CONSTRUCTION Methods and Equipment — October, 1937

ARBA Fine-Stor

Brightest of red-letter days on the calendar for the road builder who wants to keep himself well informed are the A.R.B.A. Road Show and Convention dates. JANUARY 17-21, 1938 He will want to see and compare the new machinery models that are introduced at Road Show time, and this year's show is going to be a regular "Roman Holiday" as far as new equipment is concerned. The galaxy of modern streamline units that will be on the floor at the 1938 "Five Star" Road Show will outnumber previous exhibitions — two to one. He will want to examine and judge for himself the merits of new road-building materials that will be shown. He will want to attend the highly diversified discussion sessions of the convention program. He will want to hear the opinions rendered by outstanding authorities on highway safety, soil stabilization, gas tax

AMERICANROA

Read Show

diversion, highway planning, education of highway engineering students, development of highway construction equipment, highway legislation, Federal-Aid benefit for secondary roads and municipalities, the contract system in highway work, highway illumination, and Federal rules and regulations for highway work. He will definitely not want to miss the gathering of 20,000 of the nation's leading highway officials, engineers, contractors, manufacturers and distributors. His presence at the 1938 Road Show and Convention will afford him the opportunity to "swap talk" about mutual highway problems with road men from the 48 states and 25 foreign countries.

Hotel reservations are now being made through Mr. Mark Egan, Chairman, A.R.B.A. Housing Committee, . . . Cleveland, Ohio 1604 Terminal Tower .

NATIONAL PRESS BUILDING BUILL WASHINGTON, D.C.





• No longer need you pay a high premium for the added strength once available only in Alloy Wrenches. It took Williams with their more than fifty years of wrench-making experience to bring industry this sensational wrench. Exhaustive tests demonstrate that all patterns and sizes of Williams' "Superior" Wrenches average 93% as strong as corresponding Alloy Wrenches.

Drop-forged from a selected quality carbon steel, specially processed, Williams' "Superior" Wrenches are so designed that they provide a better hand grip than the usual thin Alloy Wrench as well as increased bearing on the nut. Available in 50 patterns—more than 1,000 sizes. Demand Williams' "Superior" Wrenches from your distributor.

Consider these facts when selecting YOUR wrenches

- 1. All patterns and sizes of Williams' "Superior" (carbon steel) Wrenches average 93% as strong as Williams' Alloy "Superrenches" of corresponding dimensions!
- 2. BUT... they are actually STRONGER than Alloy "Superrenches" in the double head Engineers' Pattern, which is of popular thinner design. Also they provide increased bearing on the nut and better hand grip than the usual thin Alloy Wrench.
- 3. Williams' Alloy "Superrenches" are as strong as any alloy wrenches made commercially!
 Since Williams' "Superior" Wrenches also cost much less:

WE DEFINITELY RECOMMEND

- . . . "Superior" Wrenches (improved Carbon Steel) for most industrial uses.
- ... "Superrenches" (Alloy Steel) of the thin type for closequarter work, or where the user is willing to pay more than 50% extra for satisfying a contrary impression.

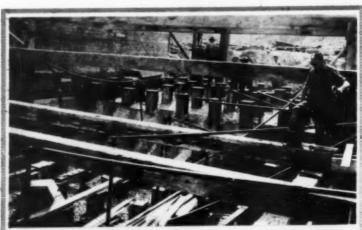
J. H. WILLIAMS & CO... 75 Spring Street, New York

Headquarters for: Drop-Forged Wrenches (Carbon and Alloy), Detachable Socket Wrenches, "C" Clamps, Lathe Dogs, Tool Holders, Eye Bolts, Hoist Hooks, Thumb Nuts and Screws, Chain Pipe Tongs and Vises, etc.

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J. H. WILLIA					
Please send !	Bookin,	"How to &	elect and Us	e Wrenches."	
Name					





STEEL FOUNDATION PILES 66' LONG FOR THE ROLLER GATES ON DAM #3 — RED WING, MINNESOTA

Material was mud, silt and sand mixed with old sawdust. Pressure boils kept breaking out all over the lot — just a six acre headache, with sub-grades thirty feet below river surface.

The Government specified bone dry conditions so the contractor turned the dewatering over to Moretrench — 100%.

The Chief Engineer for the contractor (A. Guthrie Co., St. Paul, Minnesota) says:

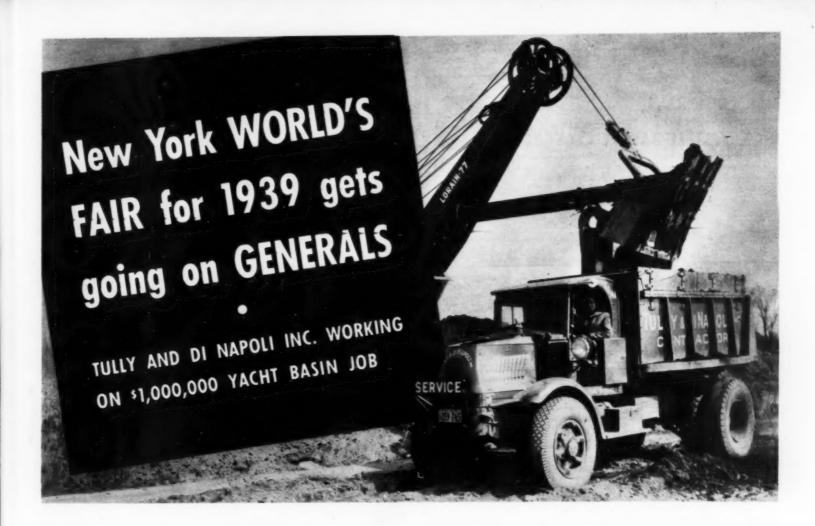
"You've given us a mighty good job!"

Thank you, Mr. Crooks.

MORETRENCH CORPORATION

Sales and Rental Office: 90 West Street, New York

Plant: Rockaway, New Jersey



• Tully & Di Napoli, Inc., of Astoria, N. Y., have contracts for removing muck from the meadows and supplying fill and top soil, building a bridge and a yacht basin as adjuncts to the land marvels of the New York World's Fair.

John McMahon, superintendent, says "Many of our twenty-two dump trucks are equipped with 13.50 Generals on the rear wheels and 11.25's in front. We have been using General tires for 15 years and they have what it takes to do a job like this.

New Heavy Duty Cleated Tractor General

- Deep cut "Chevron" tread is practically slip-proof in soft going.
- Tread is self-cleaning in mud and sand.
- Center riding rib, for smooth rolling and slow wear when running on hard surfaced roads.
- Stronger, because of two extra plies running from bead to bead.
- Cooler running due to patented no-breakerstrip construction.
- Heavy dual and triplecable beads.

GREATEST OBTAINABLE TRACTION
for excavation and oil field trucking, road machinery
and all ether heavy off-the-road work.

GENERAL TRUCK TIRES

"One of the truck haulage problems is to back the dumpers a quarter of a mile along a narrow trestle over water and marsh land through accumulated inches of slippery, water-soaked muck. At the end of the trestle a steam shovel picks up the muck and loads the trucks. Fill, and finally top soil, is substituted for the muck, reclaiming the swamp land and making solid ground of it.

"The bridge will cost the State \$600,000 and the yacht basis \$300,000, and the road \$100,000, so our total contracts thus far aggregate a million."

Mr. McMahon says "We also dug the anchorage for the Tri-Borough Bridge, built the Bronx approach and paved one and one-half miles of the roadway on the bridge, containing eight traffic lanes. For this job we used trucks that we had to haul up on the bridge with hoisting apparatus and run them along narrow temporary roadways.

"A skid or a slip would have meant that a truck, driver and all, would have plunged from the bridge to the ground. The same thing is true now on that trestle. If a truck skids and slips through the muck and goes off the trestle, it's just too bad. We haven't had one slip-off yet, though, and there hasn't been an accident. You

can put that down to our General non-skid tires. They're all right."

You'll always find Generals on the tough jobs. Call in your General Tire dealer. He can save you money, too.

THE GENERAL TIRE & RUBBER CO.

AKRON, OHIO

In Canada-The General Tire and Rubber Co. of Canada, Limited, Toronto, Ont.



SPRING WASHERS

Spring washers and lock washers of every type and size, including the well-known Hipower and Kantlink types. There are thousands of more places where spring washers would improve the value of any product where bolts, nuts, cap or machine screws are used.

STEEL BARREL CLOSURES

Forged and machined fittings for steel barrels, drums, tanks and metal packages, including plugs, rings and flanges. Very rugged for use in transportation of alcohol, turpentine, oils and other expensive liquids.





STEEL ROD ENDS

Drop forgings including steel rod ends of the adjustable yoke, plain yoke, and eye types. These articles in standard sizes and threads afford tremendous savings over special designs.

CONTAINER HANDLES

Forged steel handles for heavy containers—can be rigidly welded, riveted or attached by a strap to lie flat when not in use. Rugged and most satisfactory for hard usage.





RETAINING RINGS

Spring retaining rings of special heat-treated spring steel are carried in many stock sizes—both open and closed types. Use of a spring retaining ring is an excellent manner of creating a shoulder on a shaft.

RHEOSTATS-RESISTORS-LOAD BOXES AND SPECIAL APPARATUS

Our electrical division—Hardwick, Hindle, Inc.—makes as fine electrical resistance products, fixed and variable, as can be devised



Other products include windows for buses and railway cars, railway car window curtains, curtain rollers and fixtures, sash locks and lifts.

THE NATIONAL LOCK WASHER COMPANY
NEWARK, N. J. - EXPORT DIV., 15 E. 26 St., N.Y.C.







Specializing for over 70 years in the design and manufacture of wire rope and chain fittings, LAUGHLIN has established a record of dependability through the use of the best metals and other materials, expert workmanship, modern machinery, and rigid inspection.

Send for catalog showing the complete line of LAUGHLIN Industrial Hardware.

THE THOMAS LAUGHLIN CO. Portland, Maine



Need

INFORMATION?

Any time you need information on equipment or material for which you are in the market—and which you do not find featured in the advertising pages of Construction Methods—by all means let us know.

Our information department will be glad to assist you in securing any information you require, at any time.

Simply address

CONSTRUCTION METHODS

Information Bureau

330 West 42nd Street, New York, N. Y.

Where Dependable & CLUTCH Service Counts!



THERE is a good reason why most manufacturers of shovels, draglines, cranes and similar equipment have for years standardized on J-M Friction Materials. Their machinery represents a major investment . . . and therefore, they cannot afford to use any parts in their equipment except those which promise the utmost in durable, efficient service.

Johns-Manville's leadership is maintained by the thoroughly dependable performance of its friction materials under a wide variety of the toughest service conditions. Throughout their many years of use, J-M Brake and Clutch Materials have provided for more accurate control and greater efficiency of excavating equipment working at maximum capacity.

For details on linings and blocks designed for industrial work, write for our brochure, "Johns-Manville Industrial Friction Materials." Johns-Manville, 22 East 40th Street, New York City.



Johns-Manville INDUSTRIAL FRICTION MATERIALS

LITTLE DROPS OF WATER_







MOVE IT CHEAPER WITH REX SPEED PUMPS

It doesn't matter if you're pumping seepage or thousands of gallons an hout—Rex Speed Prime Pumps are designed to handle both at a lower cost—with greater dependability.

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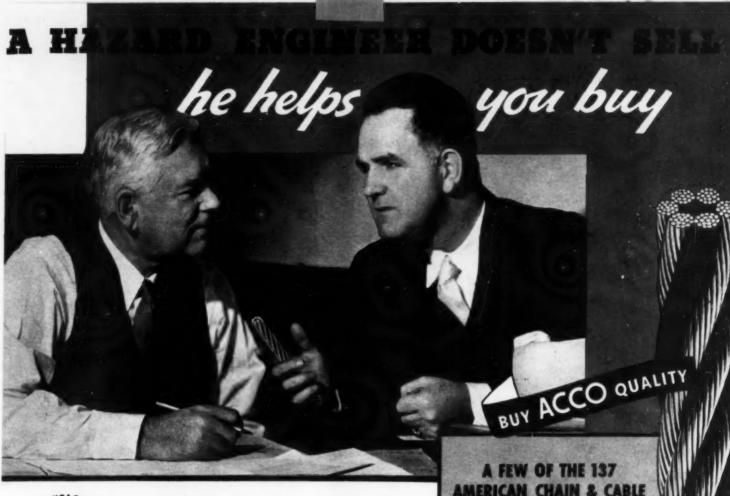
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